environmental statement
draft

BUFFALO

NATIONAL RIVER / ARKANSAS

DEPARTMENT OF THE INTERIOR

DRAFT

ENVIRONMENTAL STATEMENT

Proposed

MASTER PLAN

BUFFALO NATIONAL RIVER

ARKANSAS

Prepared by

Southwest Region and
Denver Service Center
National Park Service

Regional Director, Southwest Region

Table of Contents

(X) Draft ( ) Final Environmental Statement
United States Department of the Interior, National Park Service, Southwest Region

1. Type of action: (X) Administrative ( ) Legislative
2. Brief description of action: Proposed master plan for Buffalo National River in Newton, Searcy, Marion, and Baxter Counties, Arkansas; and proposed acquisition of lands and waters, by donation, purchase, or exchange, not to exceed 95,730 acres within a statutory limitation not to exceed $16,115,000.00.
3. Summary of environmental impact and adverse environmental effects: Establishment of Buffalo National River will attract 1.7 million visitors to a fragile river valley. As clean, free-flowing rivers become more scarce, the pressures on this river will become even more acute. Thus, some adverse human impacts may occur. Dependent upon the interest in land to be acquired and the options available to and selected by the individual landowner, there will also be direct, undeniable, and varying impacts of land acquisition upon the owners of improved and unimproved lands along the Buffalo River. Effects will include the displacement of approximately 330 area residents from homes and places of business, Federal control of land use and development on other properties where partial rights are acquired or where term or lifetime occupancy rights are negotiated, and the peripheral consequences of the conversion of 89,493 acres of private land to Federal control. Some temporary revenue loss will be experienced by county governments as a result of incremental withdrawals of revenue-producing lands from the tax rolls. Future exploitive opportunities will be foregone on acquired lands.
4. Alternatives:
   a. No action.
   b. Postponement of action.
   c. Local zoning and/or restrictive covenants.
   d. Construction of dams on the Buffalo River.
   e. Management alternatives:
      (1) Development of major automobile-oriented campgrounds.
      (2) Development of major commercial facilities at primary visitor sites.
      (3) Location of the administrative headquarters within the boundaries of the national river.
   f. Boundary alternatives:
      (1) Boundary deletions.
      (2) Boundary additions.
   g. Construction of upstream reservoirs on tributaries.
5. Comments have been requested from the following (see attached list):
6. Date draft statement made available to CEQ and the public:

5. Comments have been requested from the following:

Federal agencies

Department of the Interior
- Bureau of Indian Affairs
- Bureau of Reclamation
- Geological Survey
- Bureau of Land Management
- Bureau of Outdoor Recreation
- Bureau of Sport Fisheries and Wildlife
- Bureau of Mines

Department of Agriculture
- Forest Service
- Soil Conservation Service
- Farmers Home Administration

Department of Defense
- Army Corps of Engineers

Department of Housing and Urban Development
Federal Power Commission
Advisory Council on Historic Preservation
Environmental Protection Agency

State agencies

State Historic Preservation Officer (Arkansas)
Arkansas Department of State Planning
Northwest Arkansas Economic Development District
County Judges: Baxter, Marion, Newton, and Searcy Counties
Buffalo River Conservation and Recreation Council
Ozark Society
Mayor of Marshall, Arkansas
Mayor of Jasper, Arkansas
Mayor of Yellville, Arkansas

I. Description of the Proposal

A. Type of Action and Need for the Proposed Action

The proposed conceptual master plan will provide direction for management and development of the Buffalo National River. No approved master plan currently exists for the area. The proposed master plan provides a philosophy for development and use, but does not include detailed recommendations on design and management of specific sites.

The purpose of a master plan is to implement the general and specific mandates of Congress, cooperative agreements, if any, with other bureaus affecting the management of the area, and the administrative policies of the Service. This purpose is accomplished through the provision of criteria, controls, and guidance for resource management, resource use, and development in terms of a unified planning concept for each area consistent with and complementary to other programs of recreational use, accommodations, and resource planning in the surrounding region. Master plans serve also as zoning or space allocation plans defining not only the areas for development, but also the intensity or magnitude of development. The master plan also defines the areas in which no developments are to be permitted (National Park Service, 1968).

B. Legislative Background and Legislative Constraints on Planning

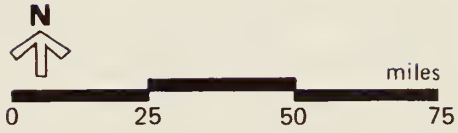
Buffalo National River is 132 miles long and flows through four counties in northern Arkansas (Baxter, Marion, Newton, and Searcy Counties) (figure 1). The national river contains approximately 90 percent of the total length of the Buffalo River. The remaining 16 miles, including the headwaters, are located within the Ozark National Forest. The National Park Service determined that the Buffalo River was of national significance in 1963, and soon thereafter the Secretary of the Interior approved the recommendation of his Advisory Board on National Parks, Historic Sites, Buildings and Monuments to preserve the Buffalo as a national river.

The national river was authorized by an Act of Congress (Public Law 92-237, 86 Stat. 44) on March 1, 1972. The act specifies that:

Figure 1

Ozark Region

Buffalo National River



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(1) The unique and scientific features of the area are to be conserved and interpreted.
(2) The river is to be preserved as a free-flowing stream.
(3) Fishing and hunting opportunities are to be provided.
(4) A wilderness determination is to be made for sections of the area.
(5) The Secretary of the Interior may acquire lands by donation, purchase, or exchange. Owners of improved noncommercial and agricultural properties not determined necessary to administration, development, or access may retain the right of use and occupancy for life or for a specified term which shall not exceed 25 years. The total acreage within the boundaries of the national river shall not exceed 95,730 acres, and the boundaries will be generally those depicted in drawing NR-BUF-7103 (figure 2).

C. Concepts of the Master Plan

1. Management category

The Buffalo National River has been placed in the National Park Service Recreation Area management category. This designation resulted from the legislative provision for hunting within the boundaries; national recreation areas are the only National Park Service units within which hunting is allowed. However, because of the highly significant natural values of the area, many of the management policies that apply to natural areas of the National Park System will be germane to the Buffalo National River.

2. Land classification

Classification of lands for various uses ensures protection of basic resources, allocates land for public facility development, guides private uses, and provides "threshold" or "buffer" lands between areas to be intensively developed and those to remain primitive. The land classification system followed by the National Park Service is based on that of the Bureau of Outdoor Recreation (U.S. Department of the Interior) and is given in Appendix A.

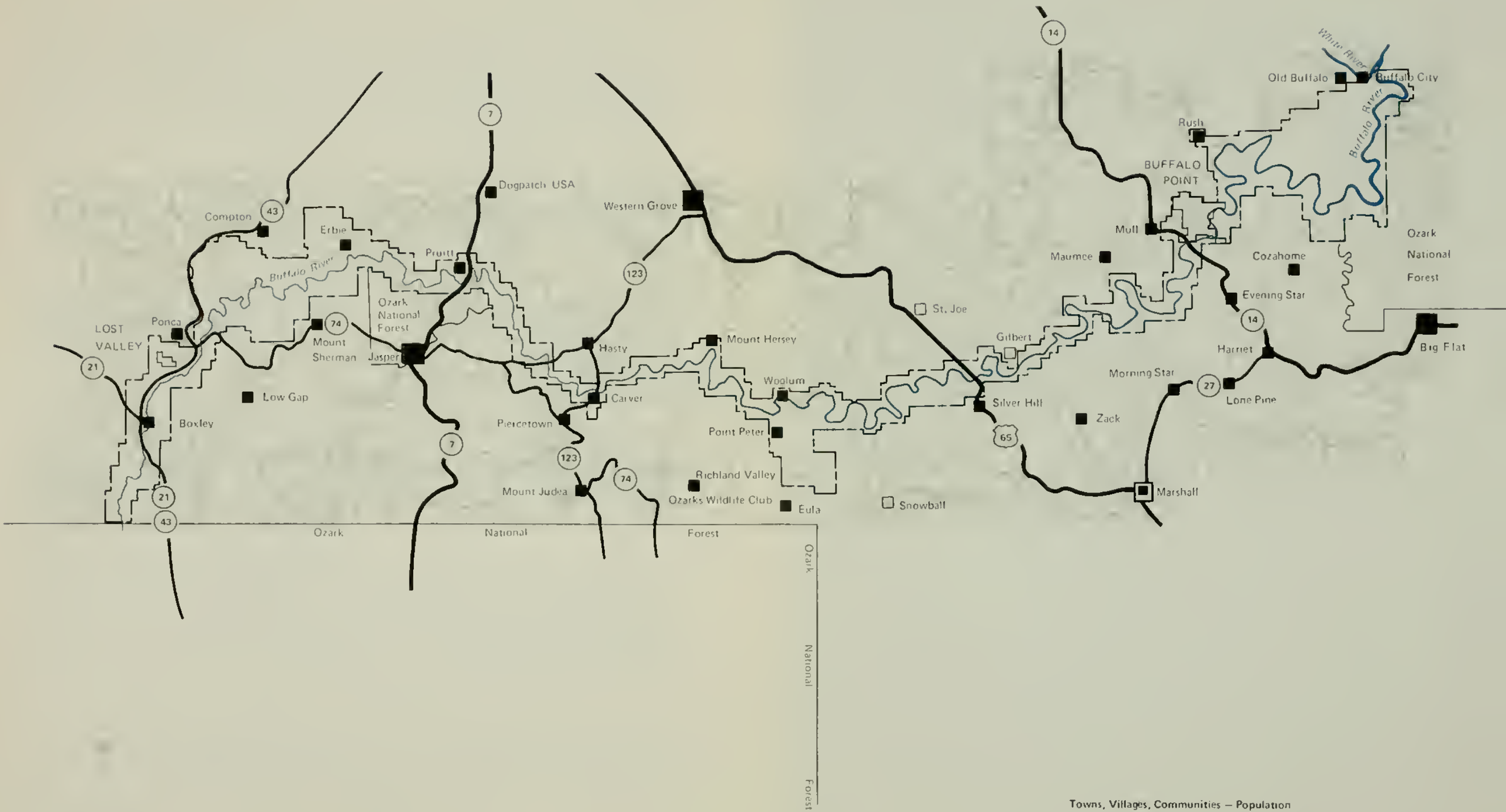

Figure 2

Boundary Map

Buffalo National River

A. The Buffalo National River land classification plan is shown in figure 3.

a. Class I (High Density Recreation) includes lands which are to be used intensively for recreation and related developments. Examples of such areas are Grand Canyon Village, Grand Canyon National Park, Arizona, and portions of Wolf Trap Farm Park for the performing arts, Virginia. Because the main developments will not be of high density, there are no Class I lands within the Buffalo National River.

b. Class II (General Outdoor Recreation) lands are reserved for moderately intense visitor-use developments. Administrative sites, picnic areas, and roads within the Buffalo National River are located on Class II lands.

c. Class III (Natural Environment) lands offer interesting and attractive natural settings and will be carefully managed in a manner providing for their preservation and for overall protection of the surrounding natural environment. Also included are all lands serving as primitive area threshold zones.

d. Class IV (Outstanding Natural Features) designation will be given to the waterfall in Hemmed-in-Hollow, certain unusually scenic river bluffs, and selected outstanding subterranean features of Beauty Cave. Surface areas around Beauty Cave and some underground passages will be classed III, and development of facilities and more intensive public use will thus be permitted.

e. Class V (Primitive) includes areas wild in character, undeveloped, and essentially removed from the effects of civilization. Forests have sufficiently recovered from past timber cutting in such areas, and they are large enough and so located that users enjoy a "wilderness experience." A few areas along the river in the primitive areas were cleared many years ago for pasture, but are now reverting to woodland.

f. Class VI (Historic and Cultural) is used for historic sites--such as the water mill near Boxley and the mining camp at Rush. Other sites may be designated if proposed research identifies them as significant historic resources.

The conceptual division of the national river into various broad land classes assures the visitor a variety of experiences as he passes through primitive,

Figure 3

Land Classification Plan

Buffalo National River

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natural, pastoral, and recreation environments (figure 4). A further breakdown of the usual land classification is proposed for Buffalo National River in order to relate land classification to the acquisition zoning plan. The Natural Environment lands (Class III) are divided into natural and pastoral areas. The natural areas will ultimately be acquired and allowed to revert to normal succession of growth, while the pastoral areas are to be perpetuated as they are presently developed. The pastoral areas, therefore, can remain in private ownership, subject to pollution and scenic controls and necessary rights-of-way for roads and trails.

3. Development for visitor use

Buffalo National River provides three general visitor experiences--it is a point of interest for the tourist, a swimming and fishing area for local users, and a destination area for the avid canoeist.

In keeping with the philosophy that the national river is to supply a special recreation experience and that its lands are to be kept in a state of the simplest possible development, overnight lodging, camping, food, and other services for visitors are generally not provided for in this plan. Such an approach, it is hoped, will stimulate activity in the private sector and result in developments at nearby communities such as Harrison, Jasper, Marshall, Gilbert, etc.

Road development and the routing of trails to emphasize points of interest within the national river will be coordinated with programs on adjacent land areas being provided by other governmental agencies and private parties.

a. Concept for circulation. Visitors will be contacted at the interfaces between the national river and its access highways, for, at these crossings, disruption to the natural setting has already occurred, access is of course available, and use is already traditional (figures 5 and 6). Formalized development will allow present uses to expand so that the sites also become centers of future public use.

The purposes of these centers will be: (1) to orient visitors to the whole national river and its environs; (2) to provide high-capacity recreational facilities oriented to the natural resources of the interface sites; and (3) to provide easy access to the river for the canoeist and johnboater.

Figure 4

Concept for Land Classification

Buffalo National River

Figure 5

Concept for Circulation

Buffalo National River

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Figure 6

Access Routes

Buffalo National River

From these centers, the visitor will be given information making it possible for him to disperse to the interpretive and scenic features or to a community service area for lodging, food service, and shopping.

Harrison will be the major tourist center serving the national river, as its broad spectrum of existing facilities and ease of access to all river points will bring most visitors into contact with this town. Serving visitors here, outside the Buffalo River watershed, will be compatible with the goal of minimizing development within the national river drainage basin. Existing development and access also support Harrison as the site for park headquarters offices and some visitor information services. Other community service areas within the basin include Marshall, Yellville, and Jasper. These communities are small but could expand.

b. Orientation. Visitors could move from the peripheral contact centers to contact stations established in the national river on each of the three main access routes. At Pruitt (on Arkansas Highway 7), Tyler Bend (on U.S. Highway 65), and Buffalo Point (on Arkansas Highway 14), visitors will be motivated to use the park and will receive orientation and information on activities. Each station will provide primitive camping, picnicking, swimming, sanitary facilities, and river access. Visitor orientation will include information about other types of recreation opportunities offered elsewhere in the region.

c. Roads. Certain existing roads will be improved to meet immediate circulation needs. New roads within the proposed boundary will be minimal, limited to those needed to serve developed areas and main scenic points. Some primitive roads will be kept as such to retain the cultural flavor of the region; others will be used administratively, such as for fire roads and maintenance of riverside campgrounds; still others will be closed to enhance the primitive character of certain sections. Any planning for roads which cross or will be adjacent to the national forest will be coordinated with the Forest Service.

d. Information-Interpretation. Attractively designed mobile interpretive units will encourage onsite contact between the visitor and the park. The units will be designed for easy relocation and use at a variety of sites throughout the area. More traditional interpretation methods will also be used, on a lesser scale, where appropriate--permanent interpretive devices along waysides, nature walks, and onsite personnel. Swimming, boating, caveing, and mine exploration safety will be part of the

program, as well as hunting and other aspects of the visitor-use and resources-management functions requiring communication to the public.

e. Visitor-use activities. Provision for certain kinds of intensive recreation will not be made within Buffalo National River because it is believed that these opportunities--including water skiing, amusement parks, trail vehicle use, museums, and cultural reenactments-- are adequate elsewhere in the region.

(1) Floating and river camping. Floating will be encouraged the entire length of the river, in season, and river access at selected points will be provided for floaters (figure 7). Most access sites will be a minor road to a simple graded or asphalt parking area at the river bank, from which the visitor will carry his canoe to the water. Sanitation facilities and another, more permanent parking area will be provided above the flood plain.

Access points will be located within an easy day's float from each other and at points accessible by existing roads. In more intensively developed recreation areas, access points will be closer together since short trips will be part of the interpretive and recreation experience.

Primitive camps and rustic river lodges will be provided at, and sometimes between, access points at locations suitable for overnight stops. Most primitive camps will provide, as a minimum, drinking water, pit toilets, and trash cans, with road access for maintenance purposes only. The rustic river lodges will utilize existing structures when suitable buildings are acquired and an adequate management and maintenance arrangement is made. Existing informal camping on gravel bars will be prohibited to minimize human impacts on these areas.

All existing float outfitters will be offered concession permits. At the present time, river use will not be limited for commercial operators or private users. The river is below optimum use at present; ultimately, when the maximum capacity is reached, limits will be established not only for concession operators, but also for private floaters.

The larger operations at Tyler Bend and Buffalo Point will require storage of float equipment

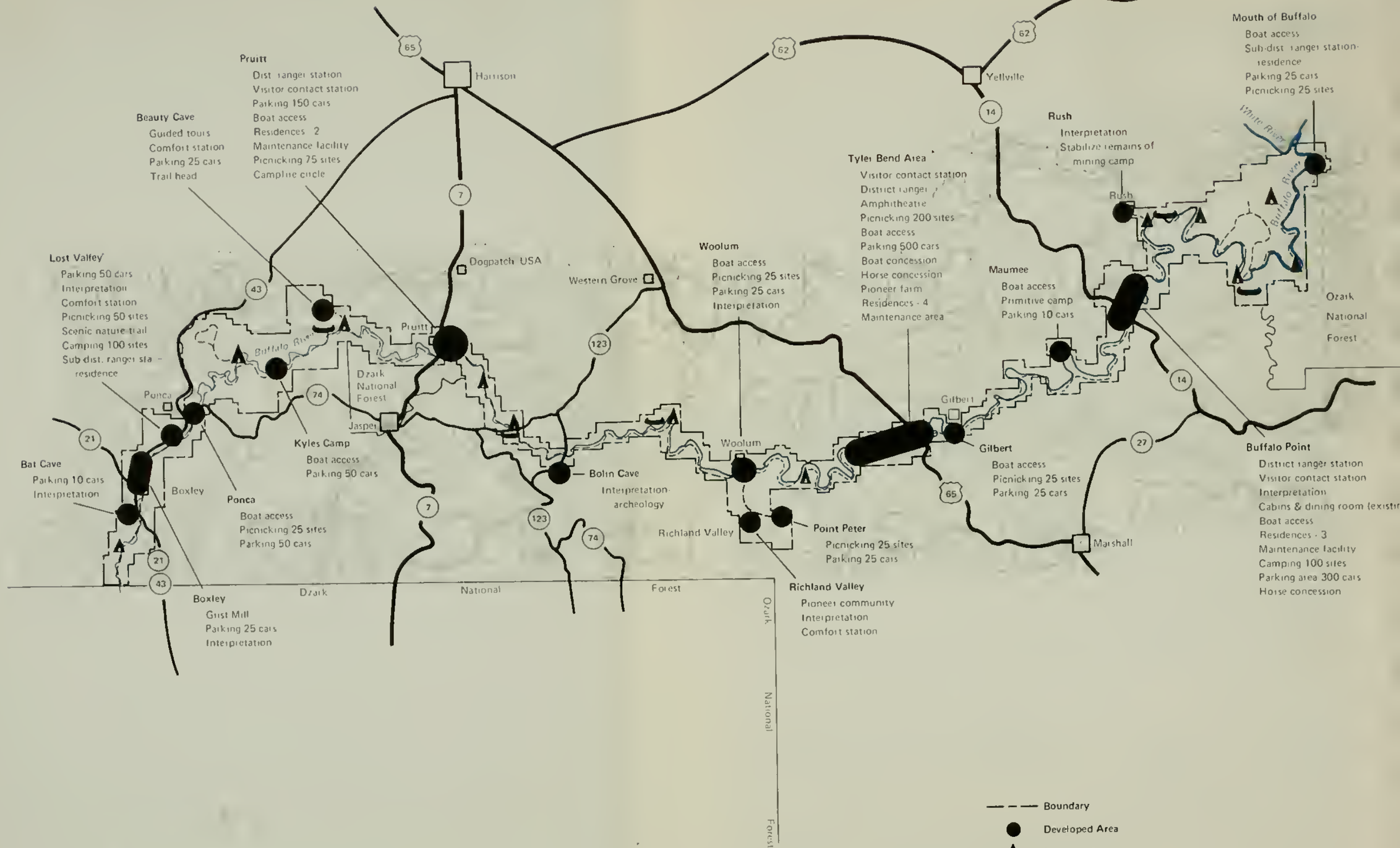

Figure 7

General Development Plan

Buffalo National River

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near the river, at least during the heavy-use seasons. Motors will not be allowed on boats in the Hemmed-in-Hollow primitive area, but, because small motors (less than 10 horsepower) have been regularly used on the lower portions of the river, continued use will be acceptable.

(2) Swimming. Swimming beaches at developed areas will have dressing rooms and sanitary facilities. Existing "swimming holes" elsewhere along the river will continue without facilities or services.

(3) Hiking. A hiking trail will be constructed along the river, linking various primitive camps and lodges that will serve hikers and river floaters. Some additional camps will be established for the overnight hiker, especially in areas where the boundaries extend farther from the rivershore. Short trails from river points to outstanding scenic features and loop trails near heavy-use areas will also be developed. Motorized trail vehicles will not be permitted. Coordination with other existing or proposed trails, especially in Ozark National Forest, will be an important objective.

(4) Bicycling. A bike trail is proposed along the river in the Tyler Bend area. Other possibilities for bike trails exist in Boxley Valley and on the abandoned railroad grade between Gilbert and Brush Creek.

f. Fees. Entrance fees will not be collected. There are too many access points and it would be impossible to separate through-travelers from park visitors. Fees may be charged for use of recreation facilities where applicable. Camping fees are presently being charged at the former Buffalo River State Park.

g. Sites suitable for development. Beginning at the head of the river, certain sites are appropriate for application of some of these development concepts.

(1) Boxley. Existing roads in this scenic area overlook forested hills and agricultural valley land. Historic resources (see section II.E) will be interpreted. A bicycle trail could be developed near the valley road.

(2) Lost Valley. An outstanding area for hiking and nature study, Lost Valley offers picnicking and nature interpretation. A ranger station here will be

the base of protection operations for the upper river down to Hemmed-in-Hollow primitive area.

(3) Ponca. This is a major floater's access site in the spring and a sightseer's scenic viewing and historic interest area the year around. Facilities will be developed here to serve both.

(4) Steel Creek. Buildings and facilities located here could be developed as an environmental education center. As a trailhead, this area provides access to spectacular Big Bluff and to Hemmed-in-Hollow primitive area.

(5) Hemmed-in-Hollow primitive area. This area consists of richly vegetated, rugged slopes; a 200-foot waterfall; and scenic streams with interesting rapids and rock formations. A trail system for hikers and horseback riders will provide the only access.

(6) Kyles Camp. After a full day's float, Kyles Camp will be the first access below Ponca. The site is also a trailhead for the Hemmed-in-Hollow primitive area, so a primitive camp here will serve both hikers and floaters. Sanitation facilities will be provided. Structures acquired here will be utilized for group camps and environmental education.

(7) Erbie. Access to Beauty Cave, as well as to the river, is provided here, and the open fields and mountains are suited to horseback riding and hiking. Because there are so many developed caves in the area, it is recommended that Beauty Cave remain primitive with limited access. The only public access will be via guided tour and without any permanent lighting systems. Some safety facilities may be necessary, but they are to be handled in a way that preserves the primitive character of an "undiscovered" cave. A primitive camp near the river is planned.

(8) Pruitt. Pruitt is located on the popular scenic highway (Arkansas Highway 7) from Harrison to Russellville. Dogpatch, U.S.A. is only 4 miles north and it is expected that many visitors attracted to this popular amusement park will also visit the Buffalo National River at Pruitt. This site will be one of the three major developed areas and will offer boat access, historic features, and swimming. Pruitt will be district headquarters for ranger, interpretive, and maintenance functions, covering the upper one-third of the national river.

(9) Richland Valley. This is an isolated pastoral area to be preserved through scenic easements. Because of its isolation, the valley is little disturbed by modern technology. Access from the south is by steep and winding dirt roads, a type which perpetuates the rustic character of the valley and should not be significantly improved, although a transportation system from Woolum (just north of the river and easily accessible from U.S. Highway 65) may be feasible. Point Peter, a local landmark and viewpoint, is adjacent to this valley and will be made accessible for scenic viewing of the local area and the river basin.

(10) Tyler Bend. Tyler Bend has been selected as the second of the three major developed areas because it is easily reached from a major highway (U.S. Highway 65) and has large forested and open sites with topography suitable for a variety of developments. Additionally, the river here has scenic cliffs and is deep enough for year-round floating. Much of the pastoral character of this area will be retained when it is opened for public use. District ranger, interpretive, and maintenance facilities here will serve the middle third of the national river.

(11) Gilbert. A community outside the national river now providing limited services for river users, Gilbert offers floaters a convenient terminus for trips from Tyler Bend. Boat access and picnicking will be continued at their present locations.

(12) Buffalo Point. This development is the third of the proposed major developed sites. Formerly Buffalo River State Park, it offers swimming, boating, hiking, picnicking, camping, vehicle camping, dining, and lodging, and will continue to do so. Additional access and development will be provided upriver. The area is reached via Arkansas Highway 14, an increasingly important recreation route serving the Ozark Folk Culture Center, regional reservoirs, and several campgrounds and the Blanchard Springs Caverns in the adjacent Ozark National Forest. A broad range of interpretive functions including interpretive river float trips will be featured here. Patterns of use should be studied to determine this area's long-range visitor needs. Bison may be reintroduced on a limited basis. District maintenance, protective, and interpretive facilities will be based here for the lower third of the national river.

(13) Rush. This mining ghost town will be interpreted and protected (see section II.E.).

Nearby, the mouth of Rush Creek is important as the take-out point for an easy day's float from Buffalo Point and the starting point for a 2-day wilderness float to Mouth-of-Buffalo. Boat access and a primitive camp will be provided.

(14) Mouth-of-Buffalo. At Mouth-of-Buffalo, the Buffalo River enters the White River, at the end of the national river boundary and at the end of the Buffalo primitive area. Floaters put in upstream, often at Buffalo Point or Rush, and, when they reach the river mouth, they have no convenient way back to their point of origin. They must either continue many miles down the White River or maneuver across its swift water to Buffalo City on the opposite shore, a long road back. There is also some use that originates on the White River and moves up the Buffalo using motor-powered boats. Two return routes are possible: (1) from the north, a 6-mile-long access road could be constructed from Old Buffalo to the river mouth; or (2) from the south, existing roads could be improved to join with those now serving Ozark National Forest. Even though the southern access is a more distant return to Buffalo Point and Rush, it relates better to the national forest and its visitors, and will require less new construction.

(15) Lower Buffalo primitive area. This area was heavily logged a few years ago but is rapidly recovering; it will be allowed to return to wilderness conditions. Floaters through this section, as in the past, will often use light motors to return upstream. Where feasible, trails will utilize existing unimproved roads.

4. Resource management

Buffalo National River is a linear park--a winding river in a narrow strip of land comprising only 11 percent of the total watershed. The land within, of course, will become subject to Federal controls as rights are acquired, and its pastoral/natural character is therefore reasonably assured of preservation. But continuation of the river in its pure and attractive state depends on the entire watershed, because activities and industries upslope affect the water quality--its chemical purity, bacteria count, and sediment load. Water, as emphasized throughout this plan, is the resource integral to the national river concept.

The Ozark National Forest of the Forest Service will continue to manage the headwaters of the Buffalo River under the multiple-use concept as has been done in the past. A primary objective within the multiple-use concept is the maintenance of the present high quality watershed. In fact, Congress is presently considering the

classification of most of the upper Buffalo River area as wilderness. National Park Service objectives for the management of the Buffalo National River are therefore consistent with those of the Forest Service.

Likely, the Soil Conservation Service (U.S. Department of Agriculture) will have similar goals, including that of discouraging the use of persistent chemicals in insect or plant control, and will especially assist the National Park Service in assuring that proper agricultural practices are applied within the national river. In fact, a demonstration farm is planned at Tyler Bend, at which the National Park Service will illustrate environmentally compatible farming techniques to residents and visitors, and cooperation with the U.S. Department of Agriculture in this venture could prove especially beneficial to all.

Finally, because one-third of the basin will be in Federal management and/or ownership, the basin is a potential candidate for inclusion in the national hydrological benchmark program of the Geological Survey (U.S. Department of the Interior). The latter action would provide for frequent monitoring of the basin's hydrologic characteristics so that any change thereto could be noted and, if man-induced, perhaps alleviated.

Construction, land clearing, and logging are all activities that must be done in sympathy with the purposes of the national river, control of which could probably best be accomplished on the non-Federal lands through county and State agencies. Some of the measures adopted jointly by governments at Federal, State, and county levels in the Lake Tahoe Basin of California-Nevada to preserve the clarity of those waters might be instructive. The Tahoe Regional Planning Agency developed a plan which predicts where growth will occur, and a series of ordinances tell how it will be managed. These ordinances deal with land-use, subdivisions, commercial signs, and air quality, as well as a number of other potential problems within the basin (Tahoe Regional Planning Agency, 1971). A zoning plan would be advantageous in reducing potential improper uses such as uncontrolled development on roadsides contiguous to the national river or incompatible construction on steep slopes.

Since wild animals and birds will naturally range beyond the narrow strip of land that is the national river, the National Park Service must cooperate with the

Arkansas Game and Fish Commission in managing the wildlife. In this regard, the National Park Service's objective is not to produce maximum hunting opportunity or yield, but to blend this use with others in the national river. The Bureau of Sport Fisheries and Wildlife (U.S. Department of the Interior) has observed that terrestrial wildlife habitat in the basin is of moderate value only, and therefore it is proper that the National Park Service not overemphasize this use when other resources, including that of float fishing, are of national significance. Improvement of game habitat for hunting purposes will be undertaken particularly where incidental to other programs such as the improvement of scenic or general wildlife habitat and the maintenance of open fields. In fact, certain no-firearms areas will likely be established to encourage opportunities for wildlife observation, or to protect particular sites or geographically limited wildlife. But otherwise, away from developed sites and during regularly established seasons, hunting will be an appropriate park use. Reintroduction of former native wildlife species will be desirable in some cases. The buffalo (bison) is one, with its apparent tie to the river's name. Existing pastureland along the river could be utilized as range, although, to provide safety and avoid conflicts with other land users, the herd would have to be enclosed.

5. Staff and administrative facilities

Headquarters will be located at Harrison, Arkansas, to provide liaison with other regional land-managing agencies also based there and to take advantage of the most convenient road access to the national river. Staff families will be able to find housing, educational, and medical services. The facilities needed for staff offices will require minimal public services. Should central maintenance facilities be needed, they could be operated efficiently from Harrison.

Districts will be established in the national river itself to provide onsite supervision of visitor contact, maintenance, fire control, and visitor safety. To insure efficient administration, avoid duplication of facilities, and effect security protection, each will be established at one of the development centers on the major highway access points--Pruitt, Tyler Bend, and Buffalo Point--and serve the third of the national river in its area. Facilities for staff and visitor services will have to be built in most cases, as well as employee housing where not otherwise available.

When fully developed, about 30 full-time employees are envisioned, augmented by some 40 seasonal workers for the main summer season. Some local persons with special talents could assist in interpretive programs on an occasional basis.

6. Boundaries and land acquisition

Three considerations have guided boundary location:

(1) Adequate territory must be included to preclude private development directly intrusive on the river scene.
(2) Undeveloped tracts of adequate size should provide a realistic wilderness opportunity in both the upper and lower river areas.
(3) Terrain suitable for environmentally sensitive development of visitor facilities must be available.

Several provisions of the authorizing act specify procedures to be followed in accomplishing this goal. Importantly, the total authorized to be appropriated for lands was set at not more than $16,115,000. In response, zones have been set up determining the interest in land to be acquired, based on ultimate land use (figure 8). These zones, along with the land classification plan, the general development concept, and the suggested phasing of implementation allow general priorities for land acquisition to be established that can respond effectively to actual needs as the national river is implemented as a public use facility:

(1) Development Zone--Containing 8,190 acres of land needed to develop necessary visitor and administrative facilities, in which fee acquisition will be required prior to any construction. Generally, these are the Class II lands of the land classification plan.

(2) Conservation Zone--Containing 78,133 acres and including the principal scenic, natural, scientific, and recreational lands in which ultimate fee ownership is required, but in which use and occupancy rights may be granted to property owners if they so

Figure 8
Zoning Plan
Buffalo National River

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elect. Generally, these lands are Classes IV, V, and VI of the land classification plan plus those parts of Class III not included in the Private Use Zone, below.

(3) Private Use Zone--Containing 9,407 acres including some farmlands which may continue in private ownership, subject to scenic controls and necessary right-of-way for roads and trails and so long as water and air pollution are not increased. The designation of this zone applies only to Boxley Valley, Richland Valley, and the Boy Scout Camp--all of which are Class III lands of the land classification plan.

The State of Arkansas has donated State lands to the Federal Government as expressed in the congressional hearings preceeding passage of the act and as provided for in the act. These lands included 2,270 acres within Buffalo River State Park and Lost Valley State Park, and 980 acres of the Arkansas Game and Fish Commission.

Approximately 960 acres of Forest Service (U.S. Department of Agriculture) and 500 acres of Bureau of Land Management (U.S. Department of the Interior) lands are presently being transferred to the National Park Service (U.S. Department of the Interior), as expressed in the congressional hearings. These Federal lands are located near Jasper and near the river mouth.

Finally, review of the area is required to determine potential tracts suitable for formal designation as wilderness, with recommendation to the President prior to March 1, 1975.

7. Phases of implementation

The master plan proposes development at Buffalo National River that will take a number of years. Thus, interim phases of operation are necessary to allow visitors to enjoy recreational resources as they are made available.

During the first phase, temporary manned stations beside the main highways will provide visitor information. Essential safety and protection services will be provided, as well as onsite interpretation. Buffalo

Point, with existing facilities, will continue to provide visitor services and recreation.

In the second phase, construction of the major development sites of Tyler Bend and Pruitt will proceed.

As visitor use increases, during the third phase, all three major development sites will be operational and construction will proceed on next priority sites: major river access points, Rush, and Buffalo Point.

During the fourth phase, all minor sites providing boat access, primitive camps, and picnic areas will be constructed. Upon completion of this construction, all visitor and management programs will be operational.

II. Description of the Environment

A. Regional Significance

The Buffalo River, near the heartland of the Ozarks, which extends roughly 200 miles from north to south and 150 miles from east to west, is considered one of the country's finest remaining significant natural rivers. Deeply entrenched in a meandering course, the Buffalo flows eastward through northwestern Arkansas across Newton and Searcy Counties, entering briefly Marion and Baxter Counties before joining the White River near Buffalo City. The Buffalo is the only major stream left undammed in the Arkansas Ozarks.

The headwaters and first 16 miles of the Buffalo River lie within the Ozark National Forest (figure 9). Also within the national forest are the headwaters of major tributary streams including the Little Buffalo, Big Creek, Cave Creek, and Richland Creek. The remaining 132 miles of the Buffalo River, within an elongated strip along the banks, has been proposed for acquisition as a national river. Included are features illustrating the river basin's geology, botany, wildlife, archeology, and history. A major appeal of the river is the clean, flowing waters, which support a notable sport fishery and provide an opportunity for pleasurable boating and swimming.

The Ozark Region is a land of many rivers. The largest of them have been dammed and inundated: this creation of reservoir recreation has caused the loss of free-flowing river recreation opportunity.

In Missouri, there are three rivers comparable in size (length of float stream) to the Buffalo. These are the 139-mile-long Current and its 45-mile-long Jacks Fork tributary, portions of which are preserved in the Ozark National Scenic Riverway; the 235-mile-long Gasconade, which meanders through lower, more open farm country of the Northern Ozarks; and the 191-mile-long Meramac, whose upstream portion is subject to inundation by a proposed dam and last 60 miles are punctuated with real estate development, railroads, and industry. Other Ozark streams, shorter in length than the Buffalo but generally regarded as outstanding in quality, include the following:

(1) White River, Arkansas. About 25 to 30 miles of the headwaters forks above Beaver Reservoir are floatable in the spring. More than 200 downstream miles have been inundated by four reservoirs. Below Bull

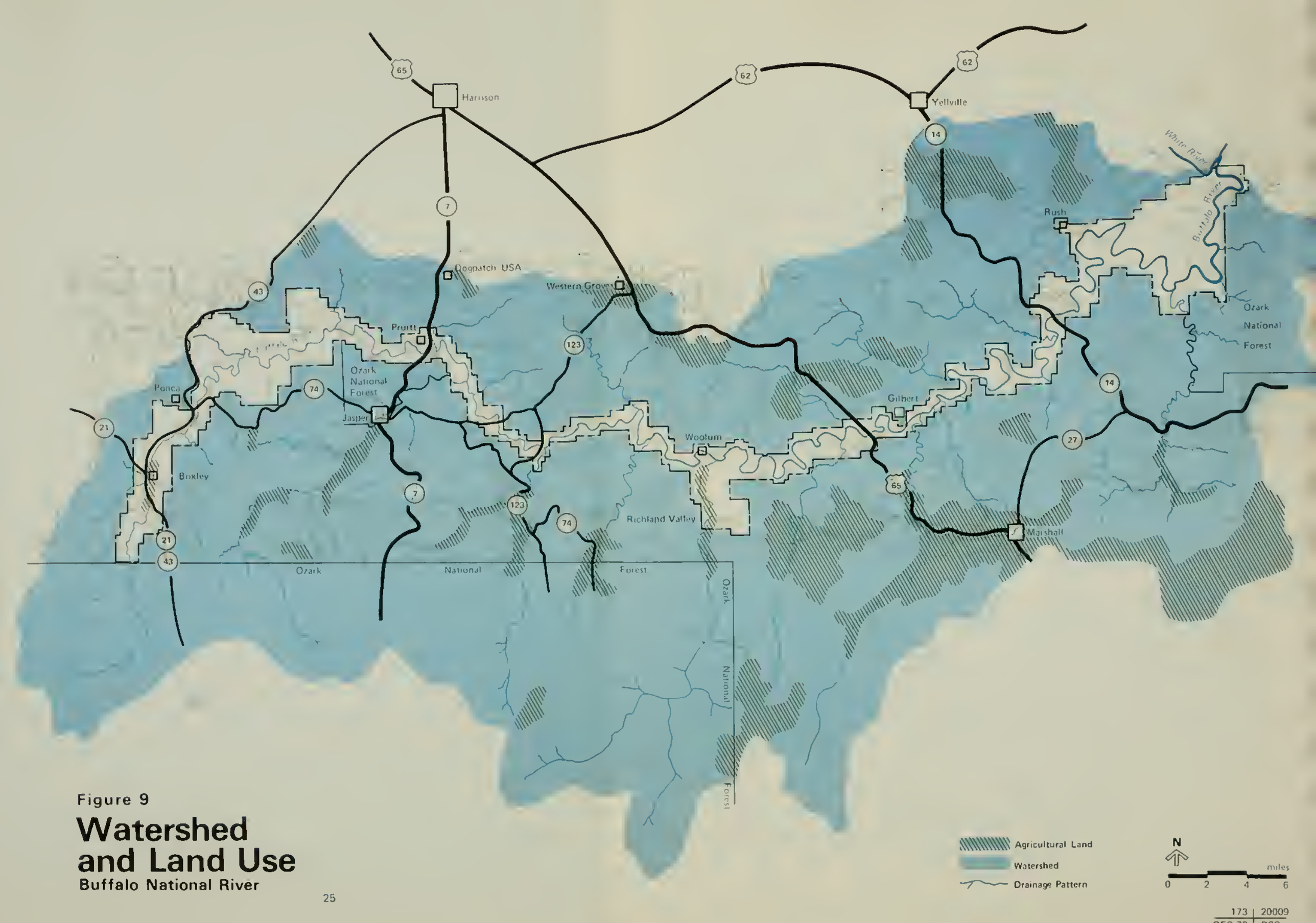

Figure 9

Watershed and Land Use

Buffalo National River

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Shoals Dam, the White River for 42 miles to Norfork is scenic and excellent for trout fishing, although settled with farms and paralleled by a railroad.

(2) Eleven Point River, Arkansas and Missouri. Situated in wilderness-like country in Missouri (49 miles) and Arkansas (35-40 miles), this river has been proposed for a scenic river (the Missouri portion) and for damming or a scenic river (the Arkansas portion).

(3) James River, Missouri. About 60 miles of the lower James have been inundated by Table Rock Reservoir. The upper 40 miles cannot be floated during low water.

(4) North Fork River, Missouri. This fork of the White River (48 miles) flows through uninhabited country and is excellent for whitewater sport. The lower North Fork has been tamed by Norfork Dam in Arkansas.

(5) Mulberry River, Arkansas. During its brief floating period, this river (35-40 miles) is wild and a real challenge to experienced canoeists. A portion is in the Ozark National Forest and possesses fine mountain scenery.

(6) Kings River, Arkansas. This river (30-35 miles) is a scenic stream with relatively little traffic. The lower Kings has been changed by Table Rock Reservoir and another dam is proposed for the river's middle reaches.

(7) Spring River, Arkansas. This river (55-60 miles) can be floated all year. Many summer homes and resorts line the banks and a railroad follows the stream for its entire length.

B. Regional Recreation Opportunities

Within the Ozarks of Missouri, Arkansas, and northeastern Oklahoma, are 12 major conservation reservoirs with a total of 295,000 surface acres. Most of the

developed recreation facilities are located around these reservoirs. More than 20 other large impoundments in Arkansas and Oklahoma afford reservoir-recreation opportunities for people in the area surrounding the Ozarks.

State parks in Missouri's Ozarks center around large springs and reservoirs. Arkansas' State parks in the Ozarks include Devil's Den, with deep open fissures and a wooded creek valley, and Buffalo River, with 2,000 acres of woodland and river frontage. Smaller parks are located at Withrow Springs near Huntsville, at Lost Valley on the upper Buffalo, and at Bull Shoals Dam. Eight of the nine State parks and recreation areas in Oklahoma's Ozarks are located on reservoirs.

The 1972 visitation to the two State parks within the boundary of the national river was: Buffalo State Park, 511,281; and Lost River State Park, 29,232. A breakdown of specific activities during 1971 at the Buffalo State Park included the following: camper days, 47,145; cottage rentals, 8,500; boat rentals, 1,388; interpretive contacts, 12,226; and trail use, 1,530.

A 700-acre theme park, "Dogpatch, U.S.A.," located 4 miles north of Pruitt on Arkansas Highway 7 and just outside the proposed national river boundary, attracted over one-half million visitors in 1972. "Dogpatch, U.S.A." has numerous exhibits and attractions and includes 126 lodging units, a 100-unit motel and a 600-capacity restaurant. Completed during the winter of 1972-73 were a 1,200-capacity convention center, a ski slope, and an ice skating rink.

Public recreation is well served by two million acres of national forests in the Ozarks (Ozark National Forest in Arkansas and the Mark Twain and Clark National Forests in Missouri). Much of the national forest acreage is dry uplands, thus limiting water-based recreation, but a number of facilities have been developed on small impoundments and along streams. A large cavern is being developed by the Forest Service (U.S. Department of Agriculture) at Blanchard Springs, 40 miles southeast of Buffalo River State Park, to include guided tours, campgrounds, picnic areas, lodge and dining accommodations, and trails.

National Park System areas within a 150-mile radius of the national river include the 77,000-acre-authorized Ozark National Scenic Riverways, George Washington Carver National Monument, and Wilson's Creek National Battlefield Park in Missouri; and Pea Ridge

National Military Park, Fort Smith National Historic Site, Arkansas Post National Memorial, and Hot Springs National Park in Arkansas.

Missouri's seven State forests in the Ozarks offer picnicking, camping, trails, and related activities on 100,000 acres, largely in tracts isolated from paved roads. Arkansas and Oklahoma have no State forests, but 15,000 acres of Ozark lands are controlled by the Arkansas Game and Fish Commission, including 10,280 acres in Newton and Searcy Counties in the Buffalo River watershed outside the boundaries of the proposed national river.

The many private resorts in the Ozark region include motels, restaurants, service stations, fisherman-type facilities, frontier towns, and developed caves and offer a variety from economy to luxury accommodations. Retirement and residential subdivisions are being developed which advertise onsite and peripheral recreation opportunities.

C Major Natural Features

1. Land

As described by Fenneman, the Buffalo River's physiographic location is in the Interior Highlands Division of the Ozark Plateaus Province, with the headwaters in the Boston Mountains section and the remainder in the Burlington Escarpment of the Salem Plateaus section.

Born on summits almost 2,400 feet above sea level, the river surges over rapids, moves lazily through long, shaded eddies, and sweeps gracefully against streaked canyon walls down to elevations of less than 400 feet before joining the White River. The drainage pattern consists of one main stem with a total of some 64 perennial and intermittent, and usually short, tributaries entering from both sides. The Little Buffalo is the largest tributary and Richland Creek is the next largest. The average fall of the Buffalo River is 6-1/2 feet per mile in the 132-mile national river (figure 10). The river's geologic features illustrate the complicated story of the building and erosion of the Ozark Dome. Here are many layered rocks and innumerable fossils; ancient peneplains and prominent escarpments; caves, arches and sinks; canyons and solution valleys. Terrain is generally rough, hilly, and wooded. Soils are comprised of sandy and silt loams in the more fertile flood plains of the valleys and of less productive cherty loams and clays on the steeper slopes and ridges. Thin soils which occur in most areas are easily eroded.

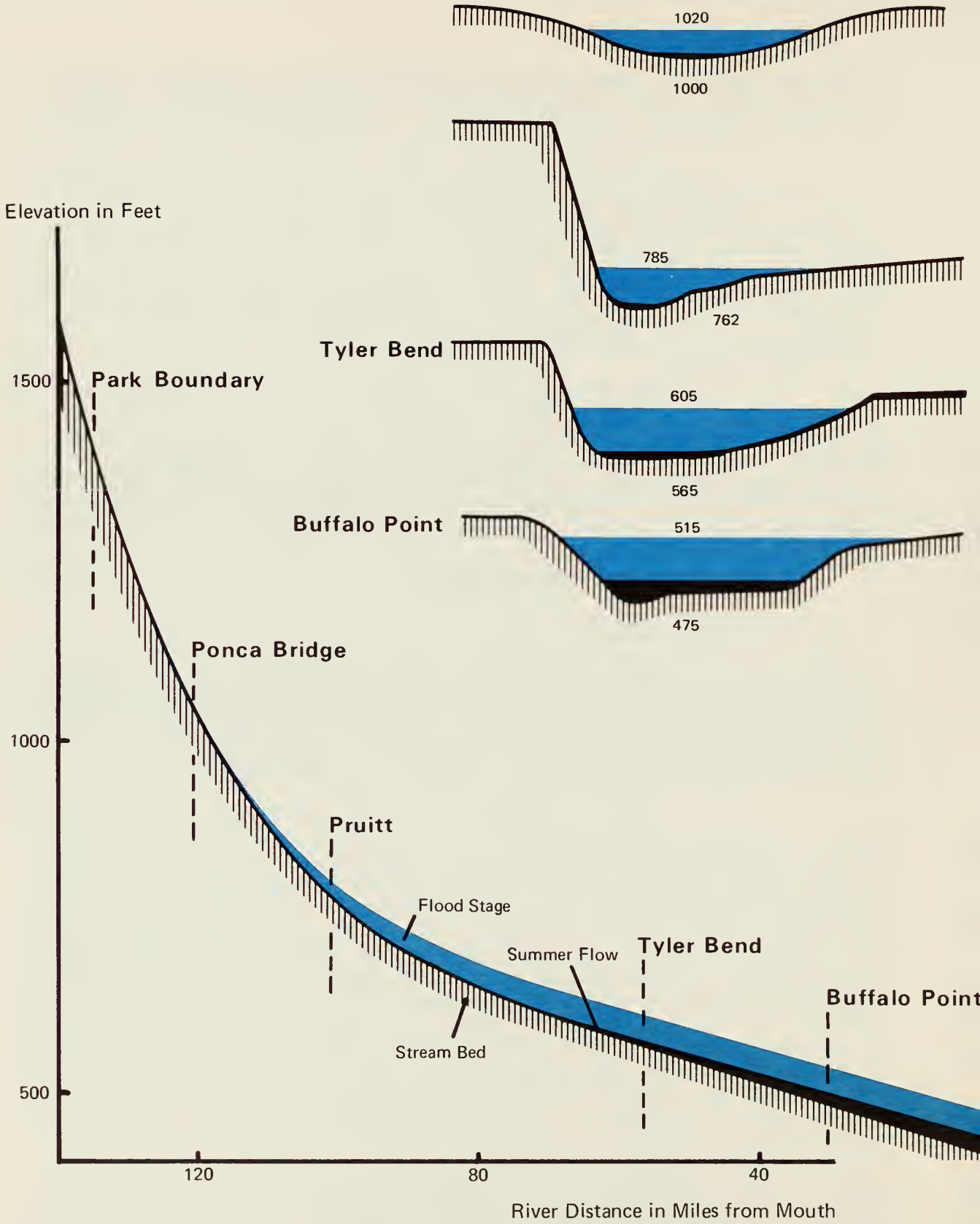

Figure 10

River Profile

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Most soils are well drained. The channel is exceptionally stable, generally composed of gravel and boulder deposits overlying the solid rock floor. Frequently, the rock strata forms the channel floor. All formations are of sedimentary origin and consist mainly of limestones and dolomites with occasional beds of shale, sandstone, and chert.

Rough terrain and steep slopes limit access to the river. River banks are often steep or covered with dense vegetation and further restrict easy access to the river. Gravel beds offer the most feasible access. The capability of the land base of the region to sustain economic land uses (crop and timber production, pasture, etc.) has been classified in a study entitled "Arkansas Soil and Water Conservation Needs Inventory" (U.S. Department of Agriculture, 1961). The risks of soil damage and limitations in use become progressively greater from Class I to Class VIII. A comparison of the Buffalo River study area (including Boone County) with the State indicates that the area is far below the average of total land area in the first four classes and, conversely, far above average in percent of total land area in the last three classes (table 1). Less than 10 percent of the land within the proposed boundary of the national river is suitable for raising crops.

The principal mineral resources are lead and zinc. Other minerals found in the four counties include tripoli, manganese, pyrite, uranium, marble, copper, fuller's earth, and phosphate rock. Ore deposits are related to the underlying igneous intrusions. Occurrence of lead and zinc is primarily in zones of shattering near faults, notably grabens. There is a wide distribution of limestone and sandstone. Actual mining operations on a continuous basis appear to have been limited to limestone, aggregate, sand and gravel, lead and zinc, and crushed stone.

There is no current mining or mineral exploration activity. The last mining of any consequence was in the Rush District in 1962. Operations ceased in 1963. The nearest lead ore smelters are 175 to 250 miles from the lead mines near Ponca. The closest zinc smelter is in St. Louis.

2. Climate

The climate of the Buffalo River is pleasant and temperate. The average annual temperature is about 58 degrees and the average day-night temperature difference is approximately 29 degrees. Summers are long

Table 1. Land base capability of five-county Buffalo National River region compared to State of Arkansas.

	Percent of total land area	
	Five-county region	Arkansas
Classes 1-1V	30.8	70.3
Classes V-V111	69.2	29.7

Tables 2 and 3 illustrate existing ownership and land use within the proposed boundary of Buffalo National River.

Table 2. Ownership types within the proposed boundary, Buffalo National River.

	Acres by county				
	Newton	Searcy	Marion	Baxter	Total
Federal	430	43	640	290	1,403
State	1,140	120	1,990	0	3,250
Private	41,219	24,190	23,354	730	89,493
*Total Acreage	42,789	24,353	25,984	1,020	94,146

*These totals are based on an examination of original survey plats and show a slight discrepancy and smaller total number of private and overall acreage than the 95,730 specified in Public Law 92-237. Final resolution of the various ownerships may differ slightly from those shown.

Table 3. Land use in acres of private land within the proposed boundary, Buffalo National River.

	Newton	Searcy	Marion	Baxter	Total
Unimproved land					
Cropland	3,443	2,703	655	32	6,833
Pastureland	1,578	1,288	296	10	3,172
Woodland	37,341	20,164	22,358	1,078	80,941
Improved land					
Commercial and commercial	57	30	15		102
Other (recreational)	491	225	56		772
*Total	42,910	24,410	23,380	1,120	91,820

* An examination of original survey plats shows a total for private lands within the authorized boundary of 89,493 acres. When the acreage is finally validated by subsequent surveys, the land uses as shown may differ slightly.

and warm with July temperatures averaging about 80 degrees. The frost-free season averages 199 days. Severe winter temperatures are rare, although freezing may occur from late October to late March. January temperatures average about 40 degrees. Temperature extremes of 114 degrees to -23 degrees have been recorded within the basin. The seasons are separated by distinct springs and falls.

The area is semi-humid. The average annual precipitation is 49 inches with distribution relatively uniform throughout the year, although spring months receive slightly higher amounts. From records back to 1900, the greatest annual precipitation was 82 inches, in 1927, and the least was 30 inches, in 1901. Only 32 inches was recorded in 1947. Snowfall averages 12 inches a year and may occur from November through March.

Prevailing winds are moderate and come from the south. Drought conditions, common to the Great Plains to the west, frequently extend into the basin and affect the stream flow and plantlife. The Buffalo River basin lies in a region characterized by the occurrence of moderately intense local storms and general storms of somewhat heavier rainfall and several day's duration. The larger storms occur most frequently in the spring months; records show that they can happen at any time of year. Storms which produced major floods in the basin occurred in August 1915; April, June, and December, 1927; and February, March, April, and June 1945. Tornadic winds occur frequently in the spring.

3. Air

Air quality in a scenic area is judged not so much on its chemical aspects as on its clarity, for clarity affects the visual experience. Because the Buffalo River drains a rural region with few city or industrial sources of pollutants, and because frequent rains clean the sky, the air remains generally clear. Three sawmills do generate smoke in restricted areas, however, and a charcoal manufacturing operation produces a noxious odor in the vicinity of its kilns. Motor vehicles on the river-crossing roads introduce minor amounts of air pollution. Landowners practice occasional burning to maintain and clear open areas.

4. Water

The runoff within the basin varies to a greater degree than is indicated by the more uniform

rainfall pattern. Late summer and early fall are characterized by greatly reduced flows. This pattern is common in all years but is more pronounced during drought years. The upper half of the river cannot be floated at all times. Generally, the entire river is floatable from October until the end of May or early June (figure 11). Except for extreme dry periods, the lower half of the river can be floated almost anytime. As one of the great attributes of the Buffalo is its natural condition, its fluctuating characteristic is to be expected. In recent years, annual flows have often been lower than in the past. However, this is also the case for many streams in the region and is probably a result of annual variations in precipitation. Figure 12 illustrates this trend for the Buffalo as well as for the Kings River, which lies near, but not within, the Buffalo River watershed. Streamflows during the late summer dry periods have also shown a slight decline in recent years for both the Kings River and the Buffalo River (figure 13). However, data in figures 12 and 13 do not provide any evidence that streamflow decreases in either river have been statistically significant between 1941 and 1970.

During dry periods, the entire stream may disappear into a bed of gravel and reappear downstream. Thus, the river appears to be dry in some areas when substantial subsurface flows are actually present.

The Buffalo is generally considered an unpolluted stream, except by silt during periods of heavy runoff. A preliminary water quality analysis is summarized in appendix B. Although surrounding agricultural lands are annually fertilized with nitrogen, potassium, and phosphorus in approximately a 10-20-10 ratio, nutrient concentrations remain relatively low. Likewise, local application of 2-4D and 2-4-5T herbicides have had no observable effect upon river life. However, pollution from domestic sewage has resulted in somewhat elevated fecal coliform levels (an indication of contamination from human fecal material) near Jasper, on the Little Buffalo River, and near Hasty and Shaddox on the main river.

5. Vegetation

The vegetation along the river is rich and diverse. Hillsides and bluffs, varying in exposure, provide habitats for some 1,500 species of plants. The area is within the Oak-Hickory Forest Association, near the center of the Interior Highlands Natural Region.

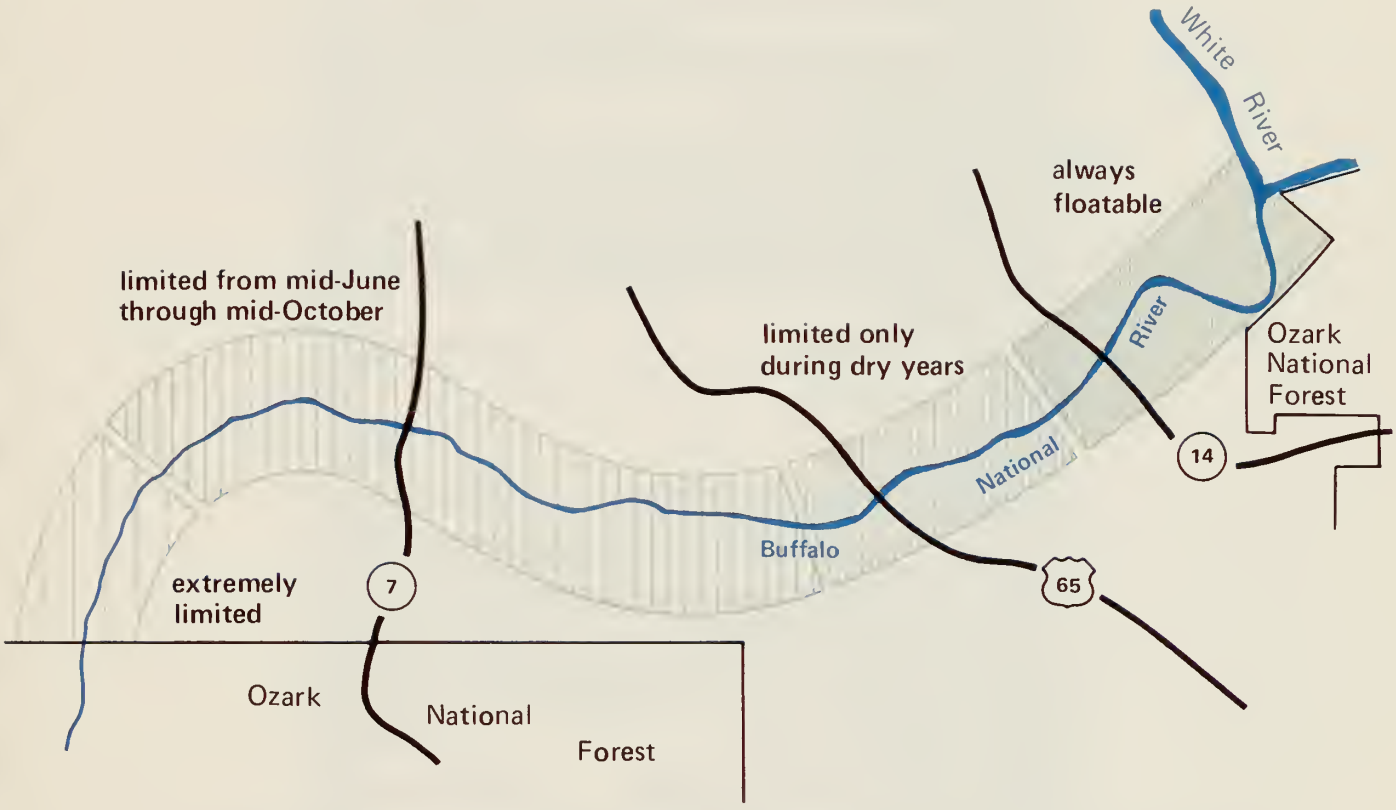

Figure 11

River Floatability

Buffalo National River

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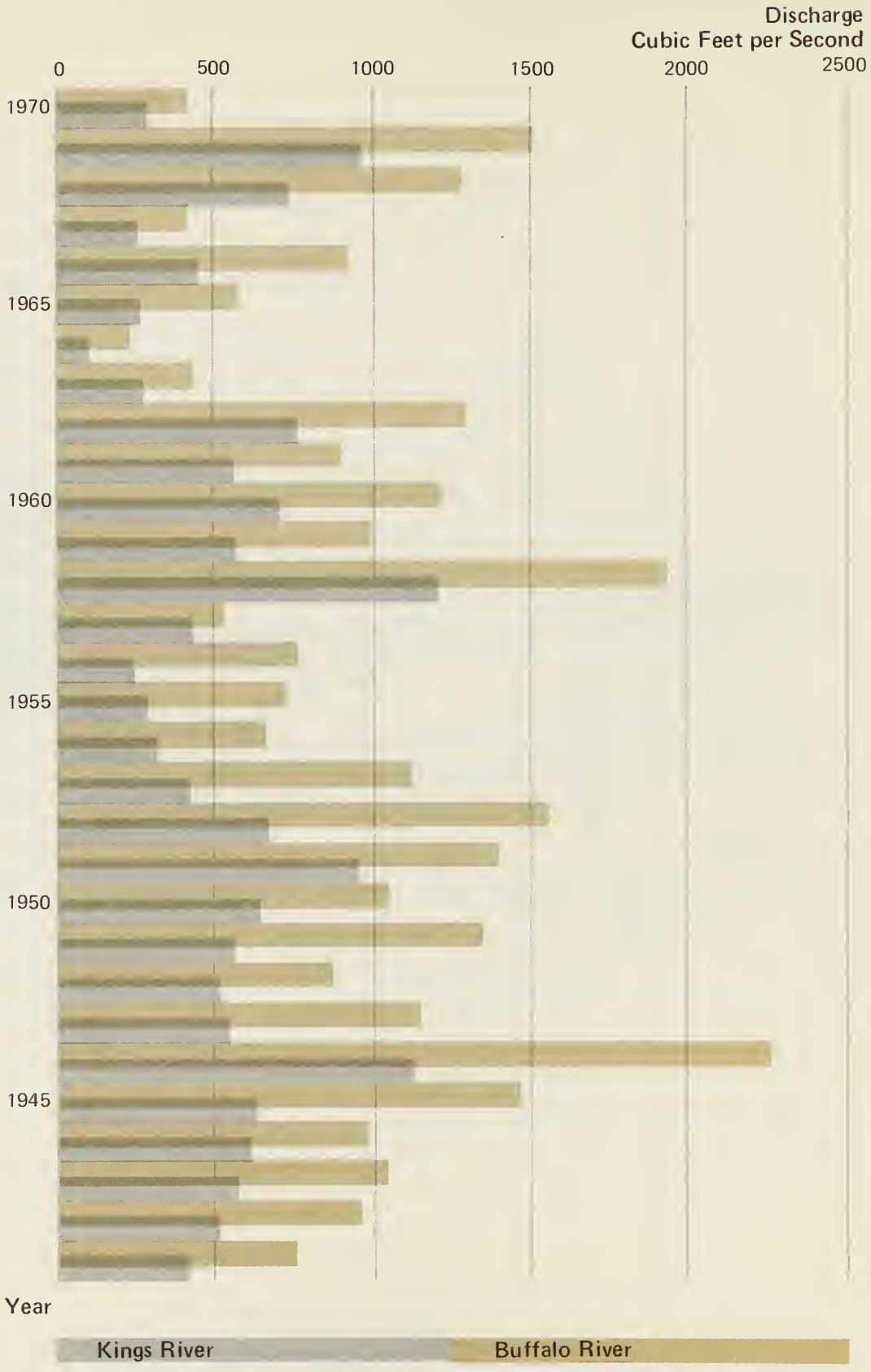


Figure 12

Mean annual discharge for Kings River near Berryville, Arkansas and Buffalo River near St. Joe, Arkansas, 1941-1970.

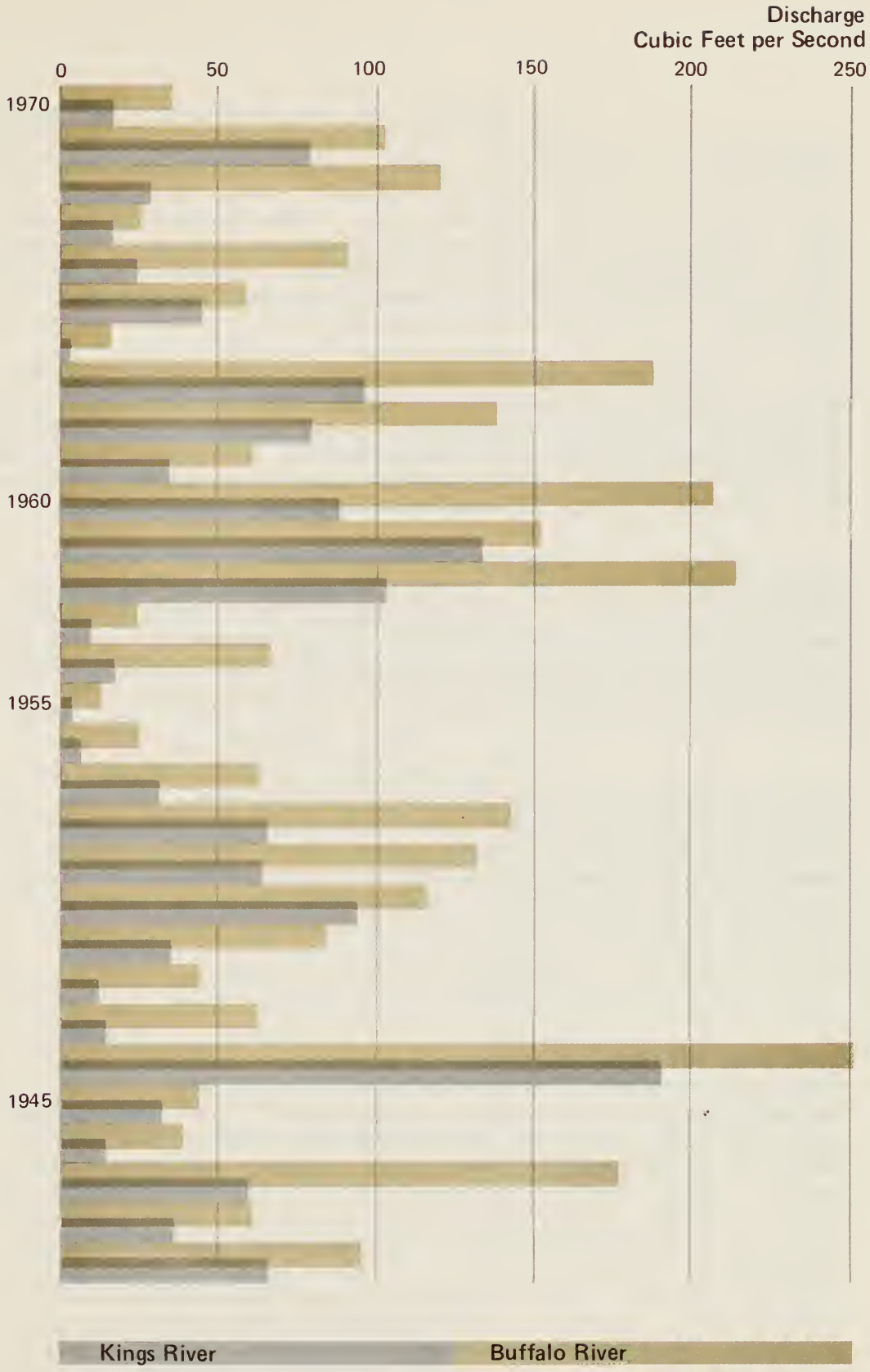


Figure 13

Lowest mean discharges for 90 consecutive day period for Kings River near Berryville, Arkansas and Buffalo River near St. Joe, Arkansas, 1941-1970.

Six species of oak and three of hickory are predominant in the Buffalo watershed. White, black, blackjack, chinquapin, post, and northern red oaks are abundant and the mockernut, black, and shagbark hickories are equally well represented. Also present are such trees as winged elm, red maple, sassafras, and persimmon and minor representations of walnut, hackberry, black gum, shortleaf pine, redcedar, sweetgum, and more than 40 other species.

Great variety of microenvironments in the Ozarks has permitted the survival of many relict species from times when a different local climate prevailed. Some of these, such as the monkey-flower, or blue larkspur, and the Indian mallow show spectacular separation from present-day areas of distribution to the west.

Ozark chinquapin and spring-flowering witch-hazel are two plants found only in the Ozark Mountains. Other species occurring in the Buffalo River watershed that are either very unusual or of limited distribution include the fee lipfern, Bradley spleenwort, smoketree, yellowwood, and the Ashe juniper.

Azalea, redbud, serviceberry, and dogwood are spectacular in spring or early summer, as is the fall coloring of the deciduous forest. So-called "fern falls" occur on the cooler, more moist, north-facing slopes. These cascades of ferns blanketing a precipitous, treeless incline appear from a distance to be a green-tinted waterfall.

6. Wildlife

Wildlife is present in a variety of species, if not in great numbers. Animal life of the Arkansas Ozarks is representative of the deciduous forest biome and its rivers, but diversified by the presence of endemic species and western faunal elements. Some animals have been extirpated from the region; notably, the timber wolf, elk, and the bison, which gave the Buffalo River its name. In all probability, the red wolf and mountain lion have been extirpated from the region. The status of several other rare species such as the long nose darter, blue striped darter and grotto salamander is unknown. White-tailed deer, bobcat, and coyotes are the largest native animals frequently seen in the area. Black bear, transplanted from Minnesota and Manitoba in the early 1960's, are now found in the Ozark National Forest and have been reported along the Buffalo River. Aquatic fur bearing

animals--beaver, otter, mink, and muskrat--are found along the river.

With the demise of the red wolf, commensurate with the clearing of the deciduous forest for open farming, the coyote increased and extended its range. The status of the red wolf is unclear, but it is probably absent from the Buffalo River area. It is apparent that coyotes and feral dogs have interbred, producing large offspring commonly called "coydogs" which occasionally bear a resemblance to a small wolf. The red wolf is classified as threatened in the 1973 publication "Threatened Wildlife of the United States" (U.S. Department of the Interior, Bureau of Sport Fisheries and Wildlife).

Many species of migratory waterfowl and other migratory water birds are often seen on the Buffalo during spring and fall migrations. Ornithologists have reported over 250 species of birds, many of them common throughout the year. Reintroduced wild turkey as well as the great Arkansas game bird, the bobwhite quail, are conspicuous in the area. Pileated woodpeckers and bald eagles are also occasionally seen.

The Buffalo River's principal game fish is the smallmouth bass. Also present are largemouth bass, spotted black bass, rockbass, walleye, suckers, catfish, bluegills, green perch, and sunfish. Except for outflows near the larger springs, the river's waters are too warm for trout. Unusual fish species include the studfish, chestnut lamprey, darters, and gar. The Buffalo is now an isolated ecological unit protected from an invasion of warm water rough fish by the chilled water of the White River below Bull Shoals Dam.

Important in interpreting the Buffalo River story are animals which have retained narrow habitat requirements and thus provide the best clues to past conditions and occurrences; some are listed below under appropriate headings:

Ozark Plateau endemics:

Ringed salamander
Many-ribbed salamander
Grotto salamander
Strippled darter
Yoke darter
Longnose darter
Ozark shiner

Wedgespot shiner
Bluntface shiner
Bleeding shiner

Western animals at eastern extremities of their ranges:

Brush mouse
Roadrunner
Collared lizard

Eastern animals showing disjunct Ozark ranges:

Queen snake
Wood frog
Zigzag salamander
Streamline chub
Small blindfish
Northern studfish
Greenside darter

D. Socioeconomic Environment

1. The region

The four counties adjacent to the Buffalo River are rural and sparsely settled. The population has declined during the 1960-1970 period in Newton (-2 percent) and Searcy (-4.8 percent) Counties. Tables 4 and 5 illustrate the population trends in the four counties and in the three counties most affected by the proposed national river, with comparisons to the State of Arkansas and the rural portions of the State, all derived from the 1970 Bureau of the Census data.

Population patterns of the study area reflect the relative lack of economic opportunity and consequent migration to areas and occupations in which there is the chance for improving income and living standards. The high median ages of the four counties result from both outmigration of young persons, from farms and small communities into larger communities and metropolitan areas, and the influx of retirement-age individuals attracted by favorable regional cost-of-living, tax structure, and recreation resources.

The components of population change for the 1960-1970 decade show net migration as the principal factor

Table 4. Population for selected age groups by race, sex, and median age presented by county: 1970.*

Age Group	Population		
	Total	Male	Female
	Baxter County		
All ages	15,319	7,492	7,827
0-5	1,149	604	545
6-15	2,185	1,134	1,051
16-21	1,081	524	557
22-44	3,131	1,457	1,674
45-54	1,670	777	893
55-64	2,623	1,180	1,443
65 & over	3,480	1,816	1,664
Median Age	45.7	45.4	46.0
	Marion County		
All Ages	7,000	3,433	3,567
0-5	544	287	257
6-15	1,122	581	541
16-21	506	260	246
22-44	1,441	673	768
45-54	892	430	462
55-64	1,112	530	582
65 & over	1,383	672	711
Median Age	43.4	42.5	44.3
	Newton County		
All Ages	5,844	2,965	2,879
0-5	550	279	271
6-15	1,154	589	565
16-21	557	302	255
22-44	1,384	676	708
45-54	713	353	360
55-64	733	368	365
65 & over	753	398	355
Median Age	32.4	31.5	33.2
	Searcy County		
All Ages	7,731	3,828	3,903
0-5	637	326	311
6-15	1,510	779	731
16-21	731	373	358
22-44	1,729	823	906
45-54	902	428	474
55-64	970	482	488
65 & over	1,252	617	635
Median Age	35.9	34.6	37.0
	Arkansas		
Median Age	29.1		

*U.S. Department of Commerce, Bureau of the Census
Industrial Research and Extension Center,
University of Arkansas

Table 5. Population change by county and compared with State totals.

County or as Noted	Acres in National River	Percent of Total Lands	Population 1960	Population 1970	Percent Change
Marion	26,000	7	6,041	7,000	15.9
Newton	43,610	8-1/4	5,963	5,844	-2.0
Searcy	24,530	5-3/4	8,124	7,731	-4.8
Baxter	1,590	1/2 of 1	9,943	15,319	54.1
Marion, Newton & Searcy	94,140	7	20,128	20,575	2.2
State of Arkansas			1,786,000	1,923,000	7.7
Rural (State of Arkansas)			962,000	1,021,000	5.7

in losses or gains in the four involved counties (see table 6)

Projections, by the U.S. Water Resources Council, of regional economic activity for a 29-county water resource area in Arkansas and adjacent Missouri, including the four counties in which the Buffalo National River is located, are presented in table 7.

Mountain Home (population 3,936), Baxter County, is the major urban area in the four-county area. Mountain Home and Harrison (population 7,239), Boone County, are major economic growth centers for the region. Population has increased steadily in these two cities since 1960. Population gains have primarily resulted from an increase in local manufacturing, from promotion of the recreation industry, and from the establishment of the region as a destination for retirees.

2. Potential visitation

The Ozark region is surrounded by more densely populated regions with a number of large cities. More than 10 million people live within 250 airline miles of the Buffalo River, including residents of St. Louis, Kansas City, Topeka, Wichita, Tulsa, Oklahoma City, Shreveport, Little Rock, and Memphis. If the radius is extended to 350 miles--a day's driving distance from the Buffalo--the perimeter takes in Dallas and Fort Worth and approaches Baton Rouge, Birmingham, Omaha, and Des Moines. The Buffalo, with its mild climate and lengthy outdoor season, is thus within any easy day's drive of nearly 15 million people. These large urban population concentrations are the potential visitors for whom the proposed national river's attributes and the contrast with city environments will be attractive.

The Economic Study of the Proposed Buffalo National River (College of Business Administration, University of Arkansas, February 1968) states:

"Approximately 44 percent of all the visitors should be from other states, and it is estimated that they would spend 3.3 days in the near vicinity of the proposed National Area. It is estimated that in-state visitors will spend 1.7 days in the study area. From this information, it is believed that the average length of stay of the typical Buffalo National River visitor will be 2.38 days."

Table 6. Population change by county, 1960-1970.

	Births	Deaths	Natural Increase	Net Migration Number	Net Migration Percent
Baxter	1,669	1,607	62	5,314	42.1
Marion	846	817	29	930	14.3
Newton	946	565	381	-500	-8.5
Searcy	1,262	969	293	-686	-8.7

Table 7. U.S. Water Resources Council projections of economic activity in Northern Arkansas and adjacent Missouri (29 counties).

	1969	1980	2000	2020
Population, midyear	342,277	352,300	382,700	438,000
Per capita income (1967)	1,816	2,604	5,328	10,363
Per capita income Relative (U.S.=1.00)	.53	.55	.64	.73
Total employment	109,136	116,700	139,000	171,100
Employment/population ratio	.32	.33	.36	.39
Earnings per worker (1967$)	3,962	5,724	10,790	19,711
Earnings per worker Relative (U.S.=1.00)	.58	.61	.68	.74

Generally, the primary access to the area is good, with major roads crossing the national river at a number of points (figure 5). Lateral circulation within the area is difficult, and in some instances, impossible (figure 6). The route of east-west Interstate 40 lies parallel to and some 70 miles south of the river. U.S. 62, a major route servicing resort and vacation areas across the northern Arkansas counties, lies 20 to 30 miles to the north. State Highways 7, 14, and 21 and U.S. Highway 65, the latter a major north-south artery, cross the Buffalo River Valley to provide primary access. Several gravel-surfaced State routes and unsurfaced county roads afford limited circulation within the Buffalo River watershed and lead to scattered access points on the river or to overlooks and tributary canyon rims. Local dirt roads lead to fords, camping and picnic sites, boat launching points, fishing waters, major scenic attractions, and natural features.

3. Economic factors which influence or are influenced by the proposed national river

Historically, the first settlers of the Ozarks were farmers, who, over time, exceeded the carrying capacity of their land resource. Marginal fertility of the land, erosion resulting from ill-advised land uses, isolation from market areas, and high birth rates combined to act as limiting factors to economic growth and development. Table 8 illustrates the low income and employment structure of the four-county region.

Presently, the number of economic farm units has decreased through consolidation, and average size per farm is on the rise. Pasturage is the principal use of farm land.

Marginal agricultural land in the area was often converted to timber production. The Buffalo River study area follows the pattern of the State as a whole with respect to percentage of total land area forested. Hardwood sawtimber stock has been cut more rapidly than growing stock can reach maturity. A 54 percent decrease in the volume of logs and lumber processes was noted between 1961 and 1967. If allowed to persist, this condition will lead to an eventual loss of the hardwood resource base in the area. Even with excellent forestry and conservation practices, only a rather modest and gradual increase in the forest resource and employment based on it could reasonably be expected in the Buffalo River basin.

Within the proposed boundary of Buffalo National River and immediately adjacent thereto, there are

Table 8. Income and employment statistics by county.

	Per capita personal income		Pct. change in total employment		Unemployment rate	
	1960	1970	Agri.	Nonagri.	1960	1970
Baxter	$ 1,142	$ 2,691	35.3	174.4	8.7	4.7
Marion	954	2,162	-38.1	70.6	8.3	9.0
Newton	610	1,649	-35.3	88.9	10.3	11.8
Searcy	868	2,033	-36.8	51.2	9.0	10.1

59 overnight establishments with accommodations for 3,132 persons per day according to a 1962 survey conducted by the Bureau of Business and Economic Research, University of Arkansas. The tourist business is one of Arkansas' major industries, with the lake and mountain areas of the north-central portions of the State among the most heavily visited. Two constraints on more extensive recreational development in the Buffalo River region have been the lack of a full complement of facilities and restricted lateral access.

The 1968 University of Arkansas economic study estimated that all employment directly generated by recreation and tourism in the Buffalo River study area amounted to about 8.5 percent of total 1965 employment in the area, or something over 1,400 persons. Translated into personal income, it was reported that recreation and tourism expenditures in 1965 were responsible for the creation of nearly $9 million in personal income, of which $5.3 million was direct income, and about $3.7 million was indirect income. Table 9 presents personal income payments by source for the State, the nine-county Northwest Arkansas Economic Development District, and the four-county Buffalo National River area. Tourist spending in 1970 was estimated at $13 million.

Per capita income, type of employment, and unemployment rates for the 1960-1970 period display an increase in the low income structure, a move out of agriculture, and substantial unemployment (tables 8, 10, and 11).

4. State and local land-use plans which affect, or are affected by the proposal

Land-use planning is in an embryonic stage in the four counties adjacent to the Buffalo River. County planning boards in Baxter and Marion Counties will have completed land-use plans by June 1974 and June 1975 respectively. No such plans are presently being developed for Newton or Searcy Counties. Neither does the Northwest Arkansas Economic Development District anticipate development of a regional land-use plan in the near future. Comprehensive development plans exist for the communities of Pruitt and Jasper. These plans were both prepared by the Northwest Arkansas Economic Development District.

The Governor's Advisory Committee on Land Resource Management is presently identifying areas where land-use patterns are of critical concern, on a statewide basis. Ultimately, policies will be formulated which will

Table 9. Personal income payments produced (thousands of dollars) by major source: 1970.

Source	Arkansas	*NWAEDD	Baxter	Marion	Newton	Searcy
TOTAL PERSONAL INCOME PAYMENTS	5,376,000	566,240	37,149	9,251	7,358	12,283
WAGE AND SALARY	3,169,000	315,192	19,037	3,257	2,732	5,217
Farms	99,000	6,541	145	106	53	68
Mining and construction	34,000 167,000	1,101 14,465	53 1,059	30 116	0 165	0 10
Manufacturing	962,000	103,820	6,946	462	116	1,972
Whsle and retail trade	511,000	48,981	2,323	418	218	661
Fin.,ins., and real est.	133,000	10,573	572	117	56	149
Trans., comm., and util.	250,000	24,339	1,158	353	2	64
Services	364,000	38,184	3,083	467	745	765
Government	635,000	63,449	3,672	1,188	1,344	1,450
Federal	248,000	17,659	2,127	304	498	434
State and local	387,000	45,790	1,545	884	846	1,016
Other industries	16,000	3,739	26	0	33	78
OTHER LABOR INCOME	193,000	19,665	1,246	130	70	459
PROPRIETORS INCOME	757,000	91,948	3,313	1,304	1,682	2,010
Farm	376,000	50,821	738	764	832	1,005
Nonfarm	380,000	41,127	2,575	540	850	1,005
PROPERTY INCOME	692,000	71,083	4,547	1,198	669	1,250
TRANSFER PAYMENTS	743,000	86,312	10,116	3,556	2,385	3,656
LESS SOC. SEC. CONTRI.	-178,000	-17,960	-1,110	-194	-180	-309

*Northwest Arkansas Economic Development District (nine counties)

Source: Industrial Research and Extension Center, University of Arkansas: Arkansas Personal Income Handbook, 1972.

Table 10. Manpower resources summary by county: 1970-71

Resident population 16 years of age or older

Place	Employed		Not in current work force		Not currently employed		Underemployed Underutilized		Currently Employed	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Baxter	4,454	38.3	6,678	57.4	507	56.3	112	12.4	282	31.3
Marion	2,266	49.9	2,661	50.4	356	37.3	157	16.4	442	46.3
Newton	1,506	36.1	2,208	52.9	460	65.4	51	6.7	253	27.9
Searcy	5,562	39.0	2,970	53.4	422	66.0	118	18.5	99	15.5

Source: Arkansas Employment Security Division, The Smaller Communities Program: Manpower Resources Reports for the nine counties

Table 11. Family income by income group; median family income

Place	Total No. of families	Under $3000 No.	Pct.	3000-4999 No.	Pct.	5000-6999 No.	Pct.	7000-9999 No.	Pct.
Baxter	4,854	1,217	25.0	1,120	23.1	824	17.0	806	16.6
Marion	2,095	726	34.7	483	23.0	358	17.1	356	17.0
Newton	1,569	674	43.0	359	22.9	220	14.0	167	10.6
Searcy	2,226	715	32.1	642	28.8	383	17.2	242	10.9

Place	Total No. of families	10,000-14,999 No.	Pct.	15,000 & Over No.	Pct.	Median Family Income
Baxter	4,854	598	12.3	289	6.0	5,178
Marion	2,095	125	6.0	47	2.2	3,971
Newton	1,569	107	6.8	42	2.7	3,582
Searcy	2,226	153	6.9	91	4.1	4,103

Source: U.S. Department of Commerce, Bureau of the Census, Census of Population, 1970: General Social and Economic Characteristics

provide direction for land resource management within the State of Arkansas. At the present time, however, the amount of time required to complete this task cannot be estimated with certainty.

E. Historic and Archeologic Resources

It is expected that a large number of archeological sites within the national river area will disclose the story of some 9,000 years of Indian occupation. Several Civil War skirmishes occurred along the Buffalo and lead and saltpeter works supplied Confederate forces before being destroyed by Union soldiers. The Buffalo has many artifacts relating to an important theme in rural American life: settlement and eventual overpopulation of the land, depletion of resources, and the subsequent emigration of farm families to the cities.

According to the Arkansas Historic Preservation Officer, Boxley Mill in Newton County is being considered for nomination to the National Register of Historic Places. With no properties presently listed in the National Register, Section 106 of the National Historic Preservation Act does not now apply.

Historical and archeological surveys are being conducted to assure compliance with Executive Order 11593 of May 13, 1971. Pending the results of the surveys and the application of National Register criteria and possible nomination and listing, interim protection will be provided to all properties that would seem to qualify. Also, when the data from the surveys become available and when the acquisition of land is far enough advanced to allow a comparative application of values to a representative range of cultural properties, specific determinations will be made not only to National Register nominations but also to levels of preservation and proposed uses. Subsequent plans and actions flowing from the master plan which might affect National Register properties will be subject to the review and comment of the Advisory Council on Historic Preservation.

Pending formal nomination to and acceptance on the National Register of selected properties now owned by the National Park Service, we have concluded a Joint Memorandum of Agreement with the Advisory Council (signed on December 4, 1973) to allow emergency stabilization of National Register potential structures. (See Appendix C)

III. Environmental Impacts of the Proposed Action

A. Sociological Impacts

1. Impacts of land acquisition.

The major immediate sociological impacts associated with establishment of the national river will be related to the displacement of 330 area residents from seasonal and permanent dwellings and places of business as a result of land acqisition. Types and numbers of residences and businesses that will be displaced are given in table 12. In addition, there are 5 churches and 15 cemeteries within the proposed boundaries. Special permits and easements will be issued in order to allow them to stay within the National River.

The impacts of displacement and forced migration as a result of government action are often evaluated in terms of adequate or inadequate financial compensation. However, social and emotional effects can be quite severe and may actually outweigh economic problems.

Sociological studies have attempted to define just what makes an involuntary move stressful (Burdge and Ludtke 1970). The most significant factors seem to be: (1) identification with place, and (2) apprehension over new communities.

Identification with place is found to be strongest among persons who are older, have low mobility, live in rural settings, and have a long term of residence in the area. Generally, these factors are commonly found in the affected project population.

Leaving a familiar place often involves leaving close social associations and home types (e.g., moving from a farm to a city) for a totally new environment. When nearby replacement housing is not readily available, apprehension over moving to a new location is often substantial. However, replacement housing is relatively abundant in the Buffalo River region.

The social and emotional effects of a forced move will be much more severe for those 76 families whose homes are involved than for those 44 families who occupy cottages on a seasonal basis.

2. Impacts of resource management policies

Table 12. Number, type and location of displacements as a result of fee acquisition to establish Buffalo National River

Residential Displacements	Newton	Searcy	Marion	Baxter	Total
Farm units	38	16	4	0	~~59~~ 58
Year-round residences					
Owner occupied	30	17	10	0	57
Tenant occupied	15	3	1	0	19
Seasonal homes	36	1	7	0	44
	119	37	22		178
Commercial displacements					
Stores	9	3	0	0	12
Ore processing plants	0	0	2	0	2
Lumber mills	2	0	0	0	2
Motels	5	0	1	0	6
	16	5	3		22

The national river will both preserve and make accessible 132 linear miles of some of the finest free-flowing water in the Central United States. The unique recreational experience of floating one of the few undammed major rivers in the Ozarks will be readily available to more than 10 million people within a 5-hour drive. The national river will also open approximately 78,000 acres of land to public hunting and recreation. Over 90 percent of these lands are now in private ownership and are not available to the public without permission of the owner and any additional constraints on use that the owner might require. The National Park Service will provide free access to the entire Buffalo National River. Public access is presently restricted to three or four areas, none of which is a major access point.

3. Impacts of development and use

As greater numbers of people visit the area from outside the Ozark region, the local residents will be exposed to a wide variety of lifestyles and cultural backgrounds. A change in the culture of the area itself is likely to result from increased public exposure. Such a phenomenon is already occurring in the Ozarks as a result of increasing numbers of tourists and the region's attractiveness as a retirement location.

B. Ecological Impacts

1. Impacts of resource management policies

a. Establishment of the national river will result in the preservation of one of the last free-flowing riverine ecosystems in the Ozarks. Most major rivers in the area have already been dammed; thus the Buffalo River provides important habitat for those species of plants and animals native to rivers of the Ozarks.

b. Prohibition of logging will allow approximately 81,000 acres of second growth timber to develop into a native oak-hickory climax community, and animal populations will develop correspondingly. Such animals as the red-eyed vireo, the gray squirrel, and the wild turkey will probably become more abundant.

c. Regulation of agricultural practices within private zones and their ultimate elimination from conservation and development zones will eliminate or reduce a number of potential impacts on the river ecosystem. These are:

(1) Erosion along the riverbank as a result of trampling by cattle. This is currently only a moderate problem; however, the regional agricultural economy is becoming increasingly dependent upon cattle, and such populations are thus likely to increase. Increased utilization of riverside meadows for pasture and use of the river as a source of drinking water would cause severe mechanical impact on localized areas of soil and vegetation.

(2) Pollution from fecal material of livestock. While this is not a current problem, the previously discussed trends toward cattle production could result in cattle concentrations along the river which would be sufficiently high to cause pollution.

(3) Pollution from chemical pesticides and herbicides. While there is no way of determining the number of acres of land treated with these chemicals within the proposed boundaries, such information is available for the four adjacent counties (Bureau of the Census, 1969):

	Acres treated with Pesticides	Herbicides
Baxter	91	333
Marion	525	1,248
Newton	13	289
Searcy	109	662
	738	2,532

Clearly, neither pesticides nor herbicides were used extensively in these counties as of 1969. However, herbicides are presently being used to clear brush and trees from land being converted to pasture. A common defoliant--2,4,5-T--is presently being used in unknown quantities within the Buffalo River watershed. This herbicide is a chlorinated hydrocarbon and has been known to contain impurities (dioxins) which may cause teratogenic defects (birth abnormalities) in developing animal embryos. A trend toward cattle production and pastureland may stimulate use of such herbicides.

d. Pollution from subdivision and commercial development of land along the river will be prohibited. There is a high probability that some developers would not install tertiary sewage treatment facilities and thus deteriorate the water quality of the river. There are approximately 10 potential subdivisions along the river, in addition to two recreational complexes

planned at Pruitt and below Ponca. Potential for commercial development exists at nearly all river access points.

e. Restriction of camping along the river to primitive campsites with sanitary facilities will reduce human pollution of the river. Gravel bars are popular picnic and camping sites, and there are presently no sanitary facilities in these areas. It is not uncommon to find human fecal material on gravel bars.

f. Determination and enforcement of an ultimate carrying capacity for the river will result in the prevention of environmental degradation from uncontrolled increases in river use. The task of determining a carrying capacity for a recreation area is difficult at best. Both potential environmental and aesthetic qualities of the river must be considered before any reasonable carrying capacity can be established. Proposed studies are described in section IV of this statement.

g. Existing sources of water-quality degradation will be minimized or eliminated. Within the boundaries, existing sources of sewage effluent will be eliminated, contained within a zero discharge system, or subjected to tertiary treatment. No sewage effluent from any development within the boundaries will enter the river without having undergone at least tertiary treatment.

h. Hunting pressure on wildlife populations will be increased when 72,000 acres of land are opened to public hunting. The degree of this impact should be relatively low, because the areas within the proposed boundaries are only considered to be moderately good wildlife habitat.

2. Impacts of development and use

As development of the national river progresses, visitation may increase to 1.7 million annually after 5 years. It is difficult to predict what proportion of this increase will be a result of development of the national river. Some of the impacts of increased visitor use of the river ecosystem are:

a. Increased numbers of people floating the river will probably affect the behavioral patterns of certain wildlife species, notably the mink and otter. These two species are somewhat shy of humans and their daily activity patterns and home ranges may be altered. In general, however, wildlife not subject to hunting should

readily become accustomed to the presence of people, as is the case in a number of national parks.

b. Increased visitation will undoubtedly be accompanied by greater numbers of automobiles. The 1,700,000 visitors expected annually, after 5 years, will arrive in approximately 485,000 automobiles (assuming 3.5 visitors per car; a figure determined by National Park Service traffic surveys in the area).

Although the Buffalo National River will not be an automobile-oriented park, exhaust emissions will become somewhat more concentrated in some localized areas. The greatest increase in automobile traffic may well come at the former Buffalo River State Park. River crossings at Pruitt and Tyler Bend are already heavily travelled, and increases in traffic at those locations should not be significant.

Visitation to Buffalo River State Park is currently about 750,000 annually. This may increase to a million visitors annually after the development and construction of proposed facilities. These additional visitors will arrive in about 70,000 cars (assuming 3.5 visitors per car), with two-thirds coming during a 5-month period in late spring, summer, and early fall. If each of these cars is driven through the park or to the river and back out again, a distance of about 2 miles in either case, an average daily total of 5 pounds of carbon monoxide, 1/2 pound of unburned hydrocarbons, and 1/2 pound of nitrous oxides will be produced. These quantities were calculated using 1975-76 EPA emission standards for automobiles.

c. Local governments may have to invest in additional traffic control equipment and personnel in the vicinity of Buffalo Point. Annual numbers of vehicles should not increase greatly at any of the other developed areas and crossing points. The 70,000 additional automobiles expected annually at Buffalo Point, after 5 years, will result in an average daily increase of approximately 300 vehicles during the summer months. If most of this visitation occurs in a 10-hour period, the average hourly increase would be about 30 vehicles. Such rather limited increases would not be expected to require large expenditures for control and traffic law enforcement.

d. Increased littering and solid waste generation may result from the higher levels of visitation that are expected. Littering could become an even greater problem under private ownership and control than under management by the National Park Service. Landowners would have difficulty enforcing existing State of Arkansas

antilittering laws, and would not be able to financially support an efficient solid-waste disposal system. The cost of providing trash cans and collecting and disposing of litter from along the river will be substantial.

Studies of existing national parks and monuments (Solid Waste Management Studies for Sequoia and Kings Canyon National Parks, National Park Service 1972; and Solid Waste Management Studies for Mount Rushmore National Memoral, Wind Cave National Park, Jewel Cave National Monument, and Devils Tower National Monument, National Park Service 1973) have provided a considerable amount of information about litter generation by recreationists (table 13).

While it is not possible to accurately predict the amount of solid waste that will be generated by visitors to Buffalo National River, a few calculations using hypothetical values for variable may help place the magnitude of the problem in perspective. If one-half of 1,7000,000 potential visitors picnic in the area, 5 percent camp one night on the river, and all stop at a visitor center, the annual quantity of solid waste using the study figures in table 13 would be as follows:

1,700,000 visitors	X 0.5 X 0.921 lbs/visitor/day	=	782,850 lbs.
1,700,000 visitors	X 0.25 X 1.6 lbs/visitor/day	=	680,000 lbs.
1,700,000 visitors	X 0.03 lbs/visitor	=	51,000 lbs.
			809,285 lbs. (404 tons)

In 1972, Kings Canyon-Sequoia National Parks had 1.8 million visitors who generated approximately 500 tons of solid waste; while 1 million visitors to Wind Cave National Park produced about 40 tons, and 2 million visitors to Mount Rushmore National Memorial produced nearly 100 tons of solid waste. Clearly, there is a great deal of variablility among various parks, primarily because some, such as the latter two, are largely day-use, and others, such as Kings Canyon-Sequoia are popular camping locations. Because use of the Buffalo National River will be mostly day use, the estimate of 400 tons of solid waste per year may be too high, but it is probably a reasonable first approximation.

e. Increased fishing pressure on the fisheries resource of the river may result in decline in quality and/or size of game fish populations. The

Table 13. Solid waste generation rates from studies made in national parks.

Source	Area	Quantity
Picnicker	Glacier National Park	0.379 lbs/day/picnicker
Picnicker	Kings Canyon-Sequoia National Parks	0.921 lbs/day/picnicker
Picnic grounds	Devils Tower National Monument	0.692 lbs/day/picnicker
Campground	Kings Canyon-Sequoia National Parks	1.181 lbs/day/camper
Campground	Glacier National Park	1.150 lbs/day/camper
Campground	Wind Cave National Park	1.6 lbs/day/camper
Campground	Devils Tower National Monument	1.28 lbs/day/camper
Visitor center	Mount Rushmore National Memorial	.02-.03 lbs/visitor
Automobile travel	Wind Cave National Park	0.006 lbs/visitor*

* Ten miles of road within the park.

smallmouth bass may be particularly susceptible to such pressures because it is an extremely desirable game species.

f. Localized mechanical damage to vegetation and substrate may occur as a result of increased human foot traffic. However, since the river will provide the main route for movement within the boundaries, such damage will be extremely limited. The immediate areas surrounding picnic and primitive campsites will suffer soil compaction and trampling of vegetation. The degree of impact on the riverine ecosystem will be insignificant because of the extremely small percentage of land to be devoted to such facilities. Only about 300 acres, or much less than 1 percent of the total land within the national river boundaries, will actually be developed.

g. A limited amount of siltation and erosion may occur as a result of construction of visitor facilities. Such developments are only planned for three areas--Pruitt, Tyler Bend, and Buffalo Point--and typically will consist of an information center, boat launching ramp, and district headquarters. Therefore, the potential for siltation and erosion is extremely small, and should not increase the soil burden in the Buffalo River to any significant extent. After each heavy rainfall, the river contains large quantities of sediment, which further suggests that an additional small and temporary source of siltation would have no significant impact on the river ecosystem.

C. Economic Impacts

1. Impacts of land acquisition

An initial reduction in local government property tax revenue will occur (table 14).

These lower tax revenues may only be a temporary condition. The presence of the Buffalo National River may tend to enhance the value of private property in the vicinity of its boundaries, and private developments to provide visitor services outside the Buffalo National River will contribute new property tax revenues.

A 1959 study by the University of Wyoming indicated that there was a definite drop in tax income to the local county after the establishment of the Jackson Hole National Monument in 1954. In 1955, however, taxable property valuations increased and established a trend

Table 14. Impact of land acquisition on property tax revenues of counties adjacent to the Buffalo National River.

County	Estimated market value	Estimated tax rate per $1,000/mkt.	Estimated tax reduction
Baxter	$ 48,000	10.39	$ 500
Marion	865,060	10.90	9,429
Newton	1,587,670	10.96	17,401
Searcy	903,170		
			27 330
Total	$ 3,403,900		$ 37,229

Source: Economic Study of the Proposed Buffalo National River, College of Business Administration, University of Arkansas, 1967.

Table 15. Federal construction and operations expenditures, 1973 to 1977.

	Budgeted construction	Park Service maintenance payroll
1973	$ 233,000	$ 46,000
1974	2,923,000	117,080
1975	3,643,000	263,900
1976	1,262,000	371,900
1977	1,260,000	578,100

Source: P. 25 of Hearings before the Parks and Recreation Senate Subcommittee of Interior and Insular Affairs, October, 1971.

somewhat above that for the State. The conclusion was that the county had actually gained a broader tax base. Such a phenomenon may well occur in the counties adjacent to Buffalo National River.

2. Impacts of resources management policies

a. The enabling legislation, rather than the proposed master plan, prohibits construction of any dams on the main stem of the Buffalo River, but not on its tributaries. This policy will preclude construction of a proposed U.S. Army, Corps of Engineers dam at Gilbert. A number of alternate sites were studied prior to selection of the Gilbert location. The proposal would have provided the following:

(1) a dam and 87,000-kilowatt-capacity powerplant at Gilbert,
(2) a reservoir covering 47 river miles and 13,600 acres,
(3) recreation facilities on the reservoir, and
(4) a regulation structure 4.7 miles downstream.

Total project cost was to be $55,300,000 (for dam, powerplant, land clearing, land acquisition, roads, recreation development, etc.). Construction costs for providing power would be $10,390,000.

Flood control would allow for a runoff of 10.1 inches above the Gilbert damsite, which is equivalent to 443,000 acre-feet of storage. Average annual flood losses on the White River below the mouth of the Buffalo are estimated by the Corps of Engineers to be worth $2,786,000. Annual flood damage within the Buffalo River valley has always been low because of the low degree of development in the valley bottom.

Annual economic benefits of a dam at Gilbert would approximate:

(1) $1,874,000 resulting from flood control;
(2) $1,613,000 worth of hydroelectric power; and
(3) $818,000 injected into the economy by recreationists.

(All figures are in terms of 1964 prices.)

b. Some economic loss will result from prohibition of logging. A total of 80,941 acres of oak-hickory forest are within the proposed boundaries. Assuming a growth rate of 25 board-feet per acre per year (Arnold and Hottel 1963) and a stumpage value of $40 per thousand board-feet, the average yearly increase in value of timber on these lands would be $1 per acre for a total of $80,941. The actual value will obviously fluctuate with the price of stumpage. Forty dollars per thousand board-feet is a reasonable estimate of such price at the present time, and represents an average value for all common forest species present. Some individual species such as walnut are worth considerably more, while cedar, sweet gum, and others are not nearly as valuable.

Arnold and Hottel (1963) conclude that "there is not likely to ever be an increase in timber stocking sufficiently large to produce a significantly greater amount of timber products" in the Forest Service (U.S. Department of Agriculture) study areas, which included the Buffalo River. They estimate that if the land were held for timber production alone, a 1-3/4 to 2-3/4 percent return on investment would be realized, depending on prices of land and growing stock. Additionally, they state that, in most cases, "the estimated value of the land and timber growing stock at the end of 40 years discounted to the present is less that the acquisition costs and present value of the stream of management expenditures. This means that the estimated present net worth of the investment for timber production alone for the first 40 years is negative, whether the investment is by private corporations or the public."

c. Ultimately, most of the 57 farms within the proposed boundaries and outside the scenic easement zone will be acquired in fee and removed from agricultural production. However, owners of land not required for development have an option of remaining on the land for life or a term not to exceed 25 years. During this time they may continue to farm the land.

The economic impact of the eventual withdrawal of these farms from agricultural production is difficult to predict, primarily because farm product prices are certain to change, probably upward, in the future. In 1969, the average value of farm products sold in Marion, Newton, and Searcy Counties was approximately $4,000 per farm (Northwest Arkansas Economic Development District,

1972). Assuming that farms along the Buffalo River have incomes similar to those in the balance of these three counties, the total value of farm products sold was $288,000. This is about 3 percent of the $6,764,000 value of farm products sold in the three counties combined.

d. Mining will not be permitted within the proposed boundaries of the national river. The Reconnaissance of mineral interests and activity within the Buffalo National River, Arkansas (National Park Service 1972) indicates that the estimated value of mineral resources in the area is zero. Of the 75 lead and zinc mines and two processing mills within and adjacent to the proposed boundaries, none were active at the time of the study. High cost of transportation and relatively low-grade ores make such operations economically unfeasible at the present time.

The peak year for production of lead and zinc concentrates in northern Arkansas was 1917 (474 tons of lead and 17,969 tons of zinc concentrates). This production declined rapidly, and in 1951 all such mining activities in the region ceased. The current annual domestic consumption by the United States is 1.75 million tons of zinc and 1.25 million tons of lead (U.S. Department of the Interior, Geological Survey). Therefore, even if mineral production in northern Arkansas returned to 1917 levels, only an insignificant portion of the domestic demand could be satisfied.

3. Impacts of development and use

a. Construction and operation of facilities. Table 15 summarizes proposed Federal expenditures for construction and operation of facilities from 1973 to 1977.

The active impact of budgeted construction on the local economy will be directly dependent upon the capability of the local construction industry to perform the services required. The National Park Service anticipates that a high percentage of construction will be done by local firms. A substantial portion of construction funds will be spent within the five-county (Baxter, Boone, Marion, Newton, and Searcy) region.

Most payroll funds will be injected into the local economy. National Park Service employees will thus have a substantial economic impact on the region.

Table 15. Federal construction and operations expenditures, 1973 to 1977.

	Budgeted construction	Park Service maintenance payroll
1973	$ 233,000	$ 46,000
1974	2,923,000	117,080
1975	3,643,000	263,900
1976	1,262,000	371,900
1977	1,260,000	578,100

Source: P. 25 of Hearings before the National Parks and Recreation Subcommittee of Interior and Insular Affairs, October, 1971.

b. Recreation expenditures. Probably the most important source of economic impact will be the purchase of complimentary goods by recreationists while residing in the region. The average length of stay of the typical Buffalo National River visitor will probably be about 2.4 days (Bell et. al. 1968). Each of these visitors will spend approximately $9.12 per day (derived from a 1971 Better Homes and Garden's Survey of the Arkansas Recreation Industry). Based on these projections, the 1.7 million visitors that the developed national river will attract each year will spend approximately 4,080,000 days and $37,200,000 in the region.

As previously discussed, however, it is difficult to identify the number of visitors who will make the Buffalo National River their destination. A number of visitors may be drawn to the region by the large variety of recreational opportunities available, and will visit the Buffalo as a part of their itinerary.

c. Private development and investment. There should be a substantial growth in demand for service facilities for tourists. This will necessitate both an expansion of existing facilities and construction of new ones. Estimated private investment expenditures near the Buffalo National River are summarized in table 16.

D. Cultural Impacts

1. Potential vandalism to unoccupied historic resources will be minimized. While malicious vandalism is not currently a great problem, increased visitation will increase the opportunity for destruction by seekers of curios and antiques. Increased visitation would very likely occur even if the national river had not been established, and local landowners and law enforcement agencies would probably not be able to provide the same level of protection for these resources as will be provided by the National Park Service. A nearly completed study of the historic resources will allow a better estimate of this potential impact.

2. The potential for destroying archeological resources along the flood plain by land tilling and clearing will be eliminated. Unauthorized collection of Indian artifacts and other materials of archeological value will be prohibited. The magnitude of this potential impact is difficult to assess until an archeological survey of the area, currently in progress, is completed.

Table 16. Estimates of private investment expenditures near Buffalo National River (thousands of dollars)

Purpose	Average yearly expenditure	Total five-year period
Expansion and improvement	$ 185	$ 925
New facilites:	1,000	5,000
Motels	660	3,300
Restaurants	160	800
Service stations and auto repairs	110	550
Sporting goods and bait shops	70	350

Source: Bureau of Business and Economic Research, University of Arkansas.

IV. Mitigating Measures Included in the Proposed Action

A. Land Acquisition

A major concern of involved landowners will be property values; the National Park Service land acquisition officer and his staff, headquartered in Harrison, Arkansas, are charged with the task of assuring just compensation to every individual whose land is to be acquired for the national river. Important in alleviating, but not eliminating, the impact of vacating property and relocating elsewhere are the option, available to many property owners, of term or lifetime occupancy and use, and the support provided by the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. A booklet entitled "Information on Acquisition and Relocation Assistance" is available for distribution to landowners.

Land will be appraised to reflect the highest and best use by the owners, even though the tract concerned is not being used presently for that purpose. Generally, the owner has already determined the most profitable use and is so utilizing the land. Categories of land use considered are agricultural, residential, recreational, commercial, timber, mineral, and grazing.

Market value is defined by the courts as the highest price estimated in terms of money which a property will bring if exposed for sale on the open market, allowing a reasonable time to find a purchaser knowledgeable of all the uses to which it is capable of being used. Market value also is defined as the price expected if a reasonable time is allowed to find a buyer and if both seller and buyer are fully informed.

Appraisals for the Buffalo National River will be conducted by qualified persons working under contract. These appraisers must qualify as expert witnesses in condemnation cases, be extremely competent in their profession, and must have many years experience in valuation of all types of property.

In every instance, the landowner will be encouraged to accompany the appraiser during a property inspection so that the owner's opinions regarding the property are known and nothing overlooked.

The appraised value is confidential between the owner and the National Park Service, unless the owner chooses to disclose the price to others. There is no

restriction on the private owner having his own separate appraisal made at his expense.

1. Occupancy and use option

Landowners electing to reserve occupancy and use of all their property as well as the residence will have the value for the period of occupancy and use deducted from the negotiated purchase price before receiving payment. The value of such a reserved interest is assessed at 1 percent per year of the market value of the property for the period concerned for small parcels of land with dwellings. For example, if an owner elects to reserve the residence and 10 acres of his 125-acre property for 25 years, a deduction of 25 percent of the value of the residence and the 10 acres would be made from the purchase payment.

Where large parcels are involved and where farming or ranching is to continue, the annual rent and investment return on real estate in the vicinity is estimated based on comparison with similar local properties. The rent and interest rate thus determined are treated as an income stream over the term of the retained estate by use of the Inwood Table entitled "The Present Worth of One Per Annum." For example, assume a rent of $100 per month or $1,200 per annum, an 8 percent rate of return, and 25 years of retained use. The Inwood factor for 25 years at 8 percent is 10.675. Multiplying $1,200 as annual rent by 10.675 results in a present worth of $12,810. This is the amount that would be deducted from market value payment to the landowner.

When a landowner elects to retain a life estate, the number of years to be used in the determination of the value of the retained property is obtained from life insurance actuary tables.

The landowner who elects either a term of years or a life estate is not bound to live on the property longer than he so desires. The term of years remaining in the reserved estate can be sold by private treaty or on the open market, it can be assigned to another party, or it can be offered back to the National Park Service. Use of the property returns to the Federal Government at the end of the reserved period established at the time of acquisition, regardless of who owns the rights of reserved use. Owners choosing to retain occupancy and use of all or a portion of their property will have exclusive use of the property they retain and will have privacy from the visiting public. Visitor use will be in designated areas where facilities will be developed to adequately protect the resources. A

person who purchases the reserved right of occupancy and use from the original owner will enjoy full benefits of that right but the benefits under Public Law 91-646 for relocation and moving expenses will not apply to a party that purchases a reserved estate from the original owner.

2. Relocation assistance

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, passed by Congress and signed into law by the President on January 2, 1971 (Public Law 91-646) will be employed by the National Park Service to help reduce the hardships suffered by any person who will be required to move. A land acquisition officer and staff will be stationed in Harrison, Arkansas, to provide personal counseling and other advisory services as needed or desired in order to reduce to a minimum any inconveniences or problems attendant to dislocation and relocation. Available will be current and continuing information on the availability and the prices of comparable, decent, safe, and sanitary housing for sale and for rent, as well as comparable commerical properties, farms, and locations for displaced businesses. There is available relocatable land of all types within 50 miles of the national river. However, the replacement land may not be adjacent to a flowing stream such as the Buffalo.

Section 202 of the Relocation Assistance Act provides that a displaced person, upon proper application, will receive: (1) actual reasonable expenses in moving himself, his family, business, farm operation, or other personal property; (2) actual direct losses of tangible personal property as a result of moving or discontinuing a business or farm operation, but not to exceed an amount equal to the reasonable expenses that would have been required to relocate such property; and (3) actual reasonable expenses in searching for a replacement business or farm.

A person displaced from his home may itemize his expenses--supported by documentation--or, in lieu thereof, he may choose to receive a dislocation allowance of $200, and a moving expense allowance not to exceed $300 from a schedule based upon the number of rooms in his home. Similar and alternate ways are available for computing benefits if a farm or business is displaced.

Section 203 of the law authorizes payments, up to a maximum of $15,000, to qualified owners of dwellings. This payment includes the following elements: (1) the amount which, when added to the acquisition cost of

the dwelling acquired by the National Park Service, equals the reasonable cost of a comparable, decent, safe, and sanitary dwelling; (2) the amount which will compensate the displaced person for any increased costs he is required to pay for financing the acquisition of a comparable replacement dwelling; and (3) the expense for title search, recording fees, and closing costs incidental to the purchase of his replacement home.

Payments made under Public Law 91-646 in no way reduce the price which the displaced person receives for his property. Rather, they are in addition to what is determined to be due the landowner for the value of the property acquired.

The application of the Relocation Assistance Act and the aid provided by the land acquisition officer and his staff should do much to reduce the number and extent of economic and social problems which will necessarily result from the Buffalo National River land acquisition.

Severance considerations--When an individual tract of land is only partly within the boundaries of the national river, there is a provision in the public law to avoid severance costs by acquiring the entire tract. Boundaries may then be altered, consistent with acreage limitations, or the land sold or exchanged for non-Federal lands within the proposed boundaries.

3. Friendly negotiation versus exercise of the power of eminent domain

Every effort will be made to arrange on mutually agreeable terms the orderly transfer of private lands to Federal ownership. However, in the vast majority of cases where an agreement cannot be reached, a declaration of taking will not be filed concurrently with condemnations, and title to the land will not pass to the United States until the court has awarded just compensation. Only where lands are needed immediately will these two actions be simultaneous, and, in such cases, the United States will deposit into court the amount of the estimated compensation, to which the landowner has the right to immediate withdrawal (subject to liens and other encumbrances), pending judicial determination of the actual amount of money to be paid.

4. Gradual conversion

The gradual conversion of private property to Federal control, contingent upon the number of

individuals that opt for continued use and occupancy and any assessment of possessory interest applied by the counties, could reduce the immediate and abrupt tax revenue loss to local governments. Concurrent with the incremental losses of tax revenue over 25 years and beyond will be an expected increase in the local property tax base as a result of anticipated increased assessed valuations resulting from private investment in tourist accommodations and facilities. It is anticipated that the National Park Service will, within 5 years, employ 30 permanent and 40 seasonal employees at the national river. Many will be transferred from other locations, some will be hired locally. All will contribute to local and State tax revenue and the economic base. A land acquisition staff, both immigrants and locally hired, has been established in Harrison to remain there until the land acquisition program has essentially been completed.

B. Development

The estimated carrying capacity of the Buffalo National River is about 2.5 million visitors annually. However, studies have been initiated to more accurately determine the carrying capacity of the national river. The resulting restrictions, if necessary, on use of the area or upon certain portions of the area will be based on numbers of persons and types of uses that can be tolerated without irreversible deterioration of the physical environment and without diminishing user satisfaction to the point that the park experience is no longer pleasurable. Monitoring of river use will be started as a first step in determining carrying capacities and appropriate development concepts for various experiences.

Environmental impacts of increased human activity, such as damage to vegetation in developed areas and disturbance of wildlife, will be minimized by appropriate planning and law enforcement procedures. Provision of marked trails, confining impact to narrow paths, will reduce the adverse effects of heavy visitor use upon vegetation.

Erosion and siltation during construction of visitor facilities will be minimized as follows: (1) restriction of soil disturbance to minimum areas required for construction of facilities; (2) revegetation of disturbed areas as soon as possible; and (3) careful selection of sites, so that construction will not occur in areas especially prone to erosion. In areas where runoff from paved parking areas may be a problem, critical

erosional sites will be sodded or stabilized with appropriate soil conservation techniques.

To maintain scenic qualities, recreation facilities and support structures will be located where they will blend with their surroundings. The natural riverbank cover of trees and shrubs will not only be maintained where presently intact, but will also be allowed to revegetate where denuded.

Caves with particularly fragile formations will be visited on a guided tour basis only, although most caves have less spectacular features and will be left open for individual exploration.

Archeological and historical inventories will be completed not only for interpretive purposes, but also to ensure that any artifacts in undiscovered but possibly important sites are not disturbed during the construction phases of the proposed developments. Such studies are currently in progress.

Research on the status of various wildlife species has been started to determine the correct hunting level to be allowed.

It is essential that increased recreational use of the watershed does not produce pollution in the river. The National Park Service has partially funded a continuing survey and monitoring program for water quality and ecosystem analysis by the University of Arkansas. This will allow adjustments in development or resource management plans to minimize any negative environmental impacts discovered. Resource management programs will be in cooperation with local programs in areas such as Ponca.

Backcountry sanitation and littering prevention programs will be developed. The National Park Service will comply with all local, State, and Federal pollution abatement and environmental quality standards.

The fisheries resource will be managed in cooperation with the Arkansas Game and Fish Commission. Special effort will be made to maintain the Buffalo as a productive and "classic" smallmouth bass stream in an untamed, free-flowing state.

V. Any Adverse Effects Which Cannot Be Avoided Should the Proposal Be Implemented

A. Effects on Local Residents

Not monetary considerations, nor time, nor a spirit of helpfulness on the part of land acquisition personnel--or all combined--can completely diminish the inconvenience and the trauma of dislocation--of separating individuals from their local cultural heritage, historical residences, traditional land use patterns, and way of life.

B. Effects on the Local Economy

The loss of tax revenue to local governments cannot be directly compensated, although such a procedure for the first 5 years from the start of land acquisition was discussed during congressional consideration of the bill to establish the national river. The State of Arkansas will reimburse the counties concerned for tax losses resulting from establishment of the Buffalo National River. This appropriation is limited to a 2-year period, and any tax losses thereafter will not be compensated. Any such losses will then be unavoidable.

C. Effects on Water and Power Projects

Developments for hydroelectric power and water supply have been precluded. Section 4 of the act prohibits the licensing or construction of any dam, water conduit, reservoir, power house, transmission line, or other project works on or directly affecting the Buffalo National River. This prohibition, although not a proposal of the proposed master plan, may represent an adverse effect to some. There are presently no proposed water supplies which would use the Buffalo as a water source.

D. Effects on the Natural Environment

Unmitigated impacts which may occur as a result of development include the following: (1) increased local air pollution as a result of increased automobile traffic; (2) minor local traffic congestion; (3) some disruption of primitive aspects caused by construction of park facilities and trails. Such impacts should be minor.

VI. The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The principal purpose of Buffalo National River is to provide recreational enjoyment for visitors to the area. Basically speaking, floating the river, fishing, swimming, hiking, backcountry camping, sightseeing, and like activities are non-consumptive although there may be some deterioration of recreational experiences as a result of unregulated overuse. There are other uses resulting from tenure agreements on acquired land or based on land classification, such as grazing or farming which are generally considered consumptive, that will have no particular effect as a result of the proposal because they will be practiced where resources are readily renewable. As the proposal reaches full implementation, there will be rules and regulations established to fully protect the resources and restrictions and limitations imposed where required to prevent overuse. Also, a full staff together with developments as may be necessary to maintain and enhance the recreational enjoyment of the area will be provided. This type of use and regulation will assure long-term productivity of the area.

VII. Any Irreversible and Irretrievable Commitments of Resources Which Would Be Involved in the Proposed Action Should It Be Implemented

Land acquisition for the Buffalo National River will commit the area's resources to a new use--preservation of the scenery, forests, wildlife, and the land as a whole for aesthetic enjoyment and other nonconsumptive recreational purposes. While the action will enhance the likelihood of meeting this basic human need for recreation, it at the same time renders the resources unavailable for utilization in meeting the needs for food, lumber, and other products required in daily life. Within the context of the act, the resources are irretrievably committed to a new use; but, because of the requirements of the act to conserve the resources, should the act be revoked at a later date, the physical resources would remain available for return to present or other uses.

Furthermore, once relocation of displaced persons and businesses is completed, there will undoubtedly be an irretrievable commitment of the resources of the areas in which they relocate in order to satisfy their everyday needs. This will be minimized somewhat by the fact that population levels in immediately adjacent rural areas have been falling, and already established homesites and farms may be utilized in some cases. Additionally, resources in such areas have already been committed to the requirements for food and shelter, so that rather than being a commitment of resources to a new use, it is instead a more complete commitment to an existing use.

Money, material, and labor involved in the development phase (when implemented) will be irretrievably committed, as will the money and labor involved in land acquisition.

VIII. Alternatives to the Proposed Action

A. No Action

If this alternative was selected there would be considerable pressure and incentive to develop the river in an exploitive manner with the current and ever-increasing demand for recreational opportunities and activites. If a private developer with a considerable amount of capital and a well developed environmental conscience undertook the development, it would not be unreasonable to expect that the river could be maintained to provide a high-quality recreational experience. However, the amount of money needed to develop such a project would probably be greater than warranted by any potential return on investment. Consequently, a number of smaller, less adequately funded firms or individuals would be responsible for development of relatively small segments of land along the river. A good deal of variation in environmental quality could be expected among these developments.

Even if no development occurred along the river, increasing numbers of people would continue to take float trips. Without the provision of carefully selected and adequately designed and maintained campsites and sanitary facilities and the conscientious protection of the total resource, considerable environmental impact would result.

In general, the no action alternative would eliminate all environmental impacts described in section III, such as:

1. Potentially adequate resource protection for one of the finest free-flowing rivers in the central United States.

2. Socio-psychological trauma and local property tax losses which would result from land acquisition.

3. Preclusion of consumptive uses such as mining and logging.

4. Potential damage to natural and cultural resources as a result of increased visitation. (It must be noted, however, that visitation may well increase substantially even under the no action alternative.)

B. Postponement of Action

This alternative would result in most of the negative environmental impact of the proposal. Socio-psychological trauma of relocation, property tax losses, and otner impacts would all occur but at a later time. In the meantime, protection of the resource would probably continue to be inadequate and the environmental quality of the area would deteriorate.

The possible advantage of postponement would be allowance of time for local and State governments to develop land-use regulations. However in view of the embryonic state of such planning in the area and the historic failures of local land-use regulations to effectively deal with environmental problems (discussed under alternative C), the possibility of adequate resource protection would be uncertain at best.

C. Local Zoning and/or Restrictive Covenants

If the river were given protection via State or local zoning regulations, there is a good possiblity that the riverbank would remain unmarred, at least for a time.

Unfortunately, however, while zoning has worked effectively in well-established communities where there is little land speculation or pressure for new commercial facilities, it has been much less successful in preserving open space or regulating growth in developing areas. Variances or amendments are often granted when pressure for development is applied. Additionally, the close relationship in many jurisdictions between land developers and members of zoning boards has often undermined public confidence in zoning as a reasonable tool for land planning (Council on Environmental Quality, 1971).

In general, the local zoning system is ill suited to protect broader regional, State, and national values. Local governments have a limited perspective and little incentive to protect scenic or ecologically vital areas located partially or even entirely within their borders. Economic pressures often result in development which is detrimental to the environment because of local governments' dependence upon property taxes (Council on Environmental Quality, 1971).

Another method by which land use and development may be controlled is the use of restrictive covenants. Such covenants are in effect reciprocal negative easements between all tne property owners within an affected area giving each of these (a) the right to enforce the covenant, and conversely (b) the duty to conform to its restrictions.

A substantial weakness of restrictive covenants is that any suit must be brought by a plaintiff who actually owns a piece of land in the affected area. Moreover, the protection provided by restrictive covenants is not particularly reliable or permanent; if a court believes that the specific areas concerned have changed substantially, the obligations of the set of restrictive covenants may be released (Williams, 1966).

Local land use regulations alone, therefore, cannot deal effectively with many of today's environmental problems: protecting lands that have natural or esthetic value to a region; accommodating development that is necessary for a region but may not be desired by local communities; and controlling large-scale development that impacts upon more than one local government. Recent State initiatives in land use regulation are aimed at overcoming these disabilities.

It is difficult to predict precisely what the environmental impacts of this alternative would be. However, most of the impact of the no action alternative would probably occur, although in varying degrees and time periods. The most significant effect of this alternative would be increased uncertainty regarding the provision of adequate protection for the resource.

D. Construction of Dams on the Buffalo River

Construction of dams on the main stem of the Buffalo River is precluded by the enabling legislation. However, if the legislation was changed, and dams were constructed as proposed in the past, impacts such as the following would occur:

1. Natural and cultural features of the project area would be submerged.

2. The river would no longer be a free-flowing ecosystem.

3. Diversity of recreation in the area would be reduced. There are numerous reservoirs at the present time, but few remaining free-flowing rivers.

4. Land owners within the project area would be required to move.

5. Hydroelectric power would be produced, and flood control provided.

6. Both extensive and intensive recreational development would occur in the area adjacent to the reservoir.

E. Management Alternatives

It is intended and reflected in Public Law 92-237 that the Buffalo National River be administered by the National Park Service as a recreation area. The chief management objectives as outlined in the master plan are: (1) to preserve the free-flowing stream, (2) to conserve and interpret the unique scenic and scientific values, and (3) to provide the opportunity for a spectrum of outdoor recreational experiences for the American public.

Since the proposals outlined in the proposed master plan are yet to be implemented, a number of reasonable alternatives exist.

1. Develop major, automobile-oriented campgrounds

Although the construction of 600 campsites was considered, no highly developed campgounds are currently planned for the national river. National Park Service development of major campgrounds in association with roadways and entrance stations would have the following impacts:

a. The opportunity for local investors to construct private campgrounds adjacent to the national river would be reduced. Many private campgounds near other national parks charge $3 to $5 per night for campsites with water, flush toilets, and showers. The provision of 600 campsites by local investors could potentially produce $1,800 to $3,000 income per night. This income would be lost if equivalent facilities were developed within the national river.

b. Location of major campgrounds near the prime resource, the Buffalo River, would probably result in relativly large concentrations of visitors in this area. Altnough the cumulative impact on the ecosystem will be about tne same whether campgrounds are located within or outside the boundaries, dispersal of visitor-use patterns encourages natural recovery by the ecosystem. The proposed development of campgrounds outside the national river will tend to promote such dispersal.

c. Sewage treatment facilities constructed for major National Park Service campgrounds

provide tertiary treatment. Private campgrounds may not be able to provide such high-quality treatment. Since private campgrounds will be located within the Buffalo River watershed, they may increase the risk of watershed polution over Federal facilities developed within the national river. Thirty-five to forty-five gallons of sewage per camper per day are generated in campgrounds with central restrooms and flush toilets. Therefore, a potential exists for the production of 73,500 to 94,500 gallons of sewage each day (if 600 campsites were full and were occupied by a family of 3.5 people). If treatment is inadequate, significant pollution of the watershed could occur.

2. Contract major commercial facilities at primary developed areas

No major commercial developments are included within the proposed master plan. The following impacts would result from such facilities:

a. Concession-operated retail outlets such as restaurants, curio shops, general stores, and gas stations would compete with similar businesses outside the boundaries. Because of the large numbers of visitors who will stop in developed areas, concessions would have an advantage over businessess on private lands.

The cumulative economic impact might be unchanged under this alternative, but the distribution of such impact would be skewed toward the relatively few entrepreneurs who had concession contracts.

b. Visitor concentrations would be increased in the immediate areas of these retail developments, which would require, or result in:

(1) construction of large parking areas;
(2) construction of large tertiary sewage treatment plants, probably by the National Park Service;
(3) increased localized traffic congested; and
(4) reduction in the natural aesthetic quality of the areas.

3. Locate the administrative headquarters within the proposed boundary of the national river

a. This alternative would result in less efficient administration and management of the area. Harrison is centrally located and provides access to most portions of the river via improved roads. Access from any alternative headquarters site within the national river would be more difficult because most roads within the proposed boundary run perpendicular to the river. Location in Harrison also allows a closer liaison with other regional land-managing agencies also based there and easy access to the town's scheduled airline service.

b. Employee housing within the national river would require a substantial amount of land and would create an increased demand on sewage treatment facilities witnin the watershed. Approximately 50 to 75 gallons of sewage are generated per person per day in single-family developments.

c. Locating the headquarters within the boundary would require a level of development contrary to the master plan policy of minimizing development adjacent to the river. The larger a development becomes, the more complex are facilities for water and sewage treatment and operation, distribution and collection systems, refuse collection and disposal, and road networks. The complexity leads to more expense for construction as well as maintenance and operation.

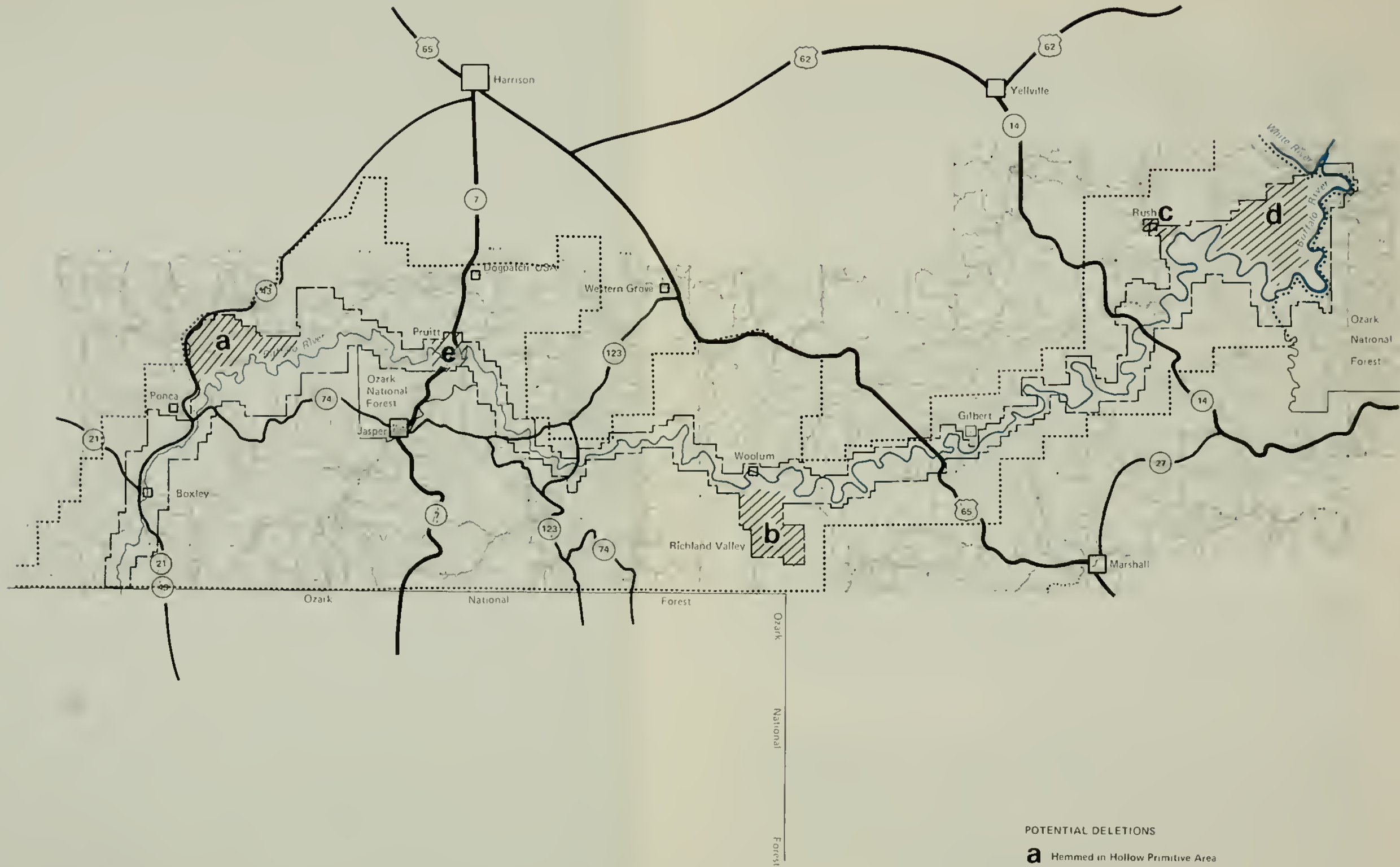
F. Boundary Alternatives

1. Boundary deletions

Certain sections of the national river could be reduced in size. The enabling legislation authorizes the Secretary of the Interior to make minor revisions of the boundary after advising the appropriate congressional committees, but the total acreage cannot exceed 95,730 acres. The following areas have been considered for deletion (figure 14):

a. Hemmed-in-Hollow primitive area (identified as "a" on figure 14). This primitive area comprises 6,000 acres of rugged terrain closely related to an extremely scenic section of the river and to Hemmed-in-Hollow Waterfall. At the present time, it is largely inaccessible. Potential land use is limited generally to low-grade hardwood production. Deletion of the area from the national river would result in the following impacts:

(1) A reduction in land acquisition costs, based on comparative sales of similar land and



POTENTIAL DELETIONS

- **a** Hemmed in Hollow Primitive Area
- **b** Richland Valley
- **c** Rush
- **d** Lower Buffalo River Primitive Area
- **e** Pruitt (change to private-use zone)

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Figure 14

Boundary Alternatives

Buffalo National River

improvements, of approximately $1,200,000 and retention within the existing Newton County tax base of lands which currently produce approximately $1,080 in annual tax revenue.

(2) Loss of assured resource protection and loss of wilderness quality of the area should random development occur. Recreational values dependent upon wilderness quality would thus be foregone.

(3) Continued logging activity with subsequent economic benefits. However, as previously discussed in section III, logging in this region is relatively unprofitable on a long-term basis. Oak-hickory forest on the nearby Ozark National Forest averages less than 1,000 board feet of sawtimber per acre. Typical annual growth rates of 4 percent result in an average growth increment of 25 board feet. This is then worth about $1 per acre, at $40 per 1,000 board feet. The maximum annual economic return would thus be 6,000 acres times $1 per acre, or $6,000.

However, the assumptions that all 6,000 acres are accessible and will produce valuable sawtimber are probably not realistic; the actual value of timber would be somewhat lower.

(4) Altered wildlife populations. Logging would result in a periodic return to early seral stages of the oak-hickory forest. Those species of wildlife native to early seral stages of forest succession, such as bobwhite quail, cottontail rabbit, and meadowlark, would thus be favored.

(5) Loss of resource protection for Hemmed-in-Hollow Waterfall. Although this waterfall is presently relatively inaccessible, a road and tourist facilities could conceivably be built in the future. If this occurred, there would be no assurance that development would be compatible with the resource. Moreover, the primitive character of the adjacent area would be lost.

b. Rush (identified as "c" on figure 14). This abandoned mining community comprises about 700 acres and is located near but is not visible from the river. Deletion of this historically significant area would result in the following impacts:

(1) A reduction of approximately $210,000 in land acquisition costs, based on averages of comparative sales of similar land and improvements, and a

concomitant retention on the Marion County tax rolls of approximately $230 in annual revenue.

(2) Potential for destruction of historic resources due to lack of permanent protection from vandalism, and loss of a potential interpretive feature to illustrate the mining history of the Ozarks. Although malicious vandalism is presently not a major problem, increased visitor use of the river, with or without the national river, could increase the probability of such damage.

c. The lower Buffalo River primitive area (identified as "d" on figure 14). This 8,500-acre primitive area is located just upstream from the mouth of the river. It is relatively undeveloped, probably due to the rough topography. It has been heavily logged in the past. A portion of this area is likely to be considered for wilderness designation in the future.

Deletion of the area would result in the following impacts:

(1) A reduction in land acquisition cost for the project of approximately $1,063,000, based on comparative sales of similar terrain, and retention by Marion County of $1,180 in annual tax revenue.

(2) Regional economic benefits resulting from potential logging of the area. The area has been logged in the past, and is approaching a harvestable stage again. Although the long-term return on investment is extremely low, logging would produce a substantial amount of gross income at the time of harvesting. Growth rates of 25 board feet per year, and values of $40 per thousand board feet would result in a maximum annual economic gain of $8,500 from the tract. However, the assumption that the entire area could be logged is probably unrealistic. Therefore, the actual economic benefits resulting from logging would be somewhat less.

(3) Altered wildlife populations. Logging would result in a periodic return to early seral stages of the oak-hickory forest. Those species of wildlife native to early seral stages of forest succession, such as bobwhite quail, cottontail rabbit, and meadowlark, would thus be favored at the expense of climax species such as wild turkey, gray squirrel, and the red-eyed vireo.

(4) Loss of opportunity for a wilderness recreational experience in the area. Additional

developments or renewed logging would definitely decrease tne wilderness quality of the tract and could result in significant pollution of the watershed.

d. Richland Valley (identified as "b" on figure 14). This 5,120-acre remote and scenic valley is visually isolated from the river. Individual privately owned tracts tend to be quite large. Scenic easements will be the principal land acquisition method for the valley, although some land may be acquired in fee. Deletion of the area would result in the following impacts:

(1) A reduction of approximately $588,000 in land acquisition costs, based on comparative fee sales of similar land and improvements, and retention by Searcy County of approximately $185 in annual property tax revenue.

(2) Probable loss of accessibility to Point Peter, a local landmark and scenic vista. The proposed master plan suggests that a road be built to the top of Point Peter, thus large numbers of visitors will have access to this vantage point. If the Richland Valley were excluded from the boundaries of the national river, the interpretive and scenic values of Point Peter would be lost to the national river visitor. Damage to the local ecosystem as a result of the proposed road construction would not occur. However, there would be no assurance that a road would not be built, perhaps by a private developer. Human impact on vegetation and wildlife in the Point Peter area could be reduced as a result of lack of access. However, if a road and commercial development were built by private developers, there would be no substantial resource protection available.

(3) Potential loss of the historic and interpretive values of a typical pioneer settlement to the national river visitor. The National Park Service proposes to maintain the Richland Valley in a relatively low level of develoment. The existing steep and winding dirt access-roads will not be improved to any great extent. Thus, the impact of modern technology on the area will remain relatively low. If the area were excluded from the proposed boundaries of the national river, there would be no assurance that commercial or recreational development would not alter the rustic character of the valley, although the National Park Service is not aware of any such plans at the present time.

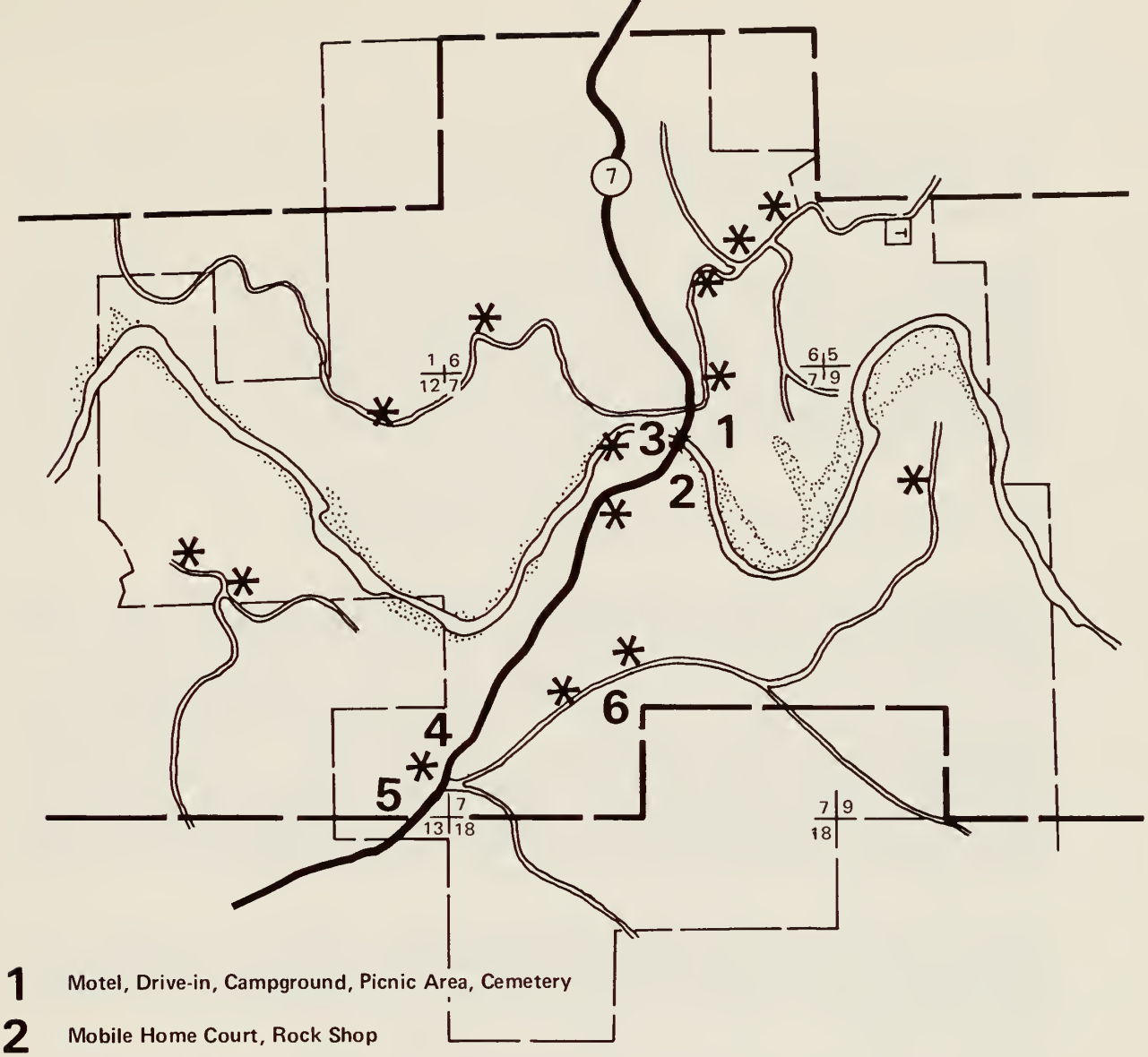
e. Pruitt (identified as "e" on figure 14). This incorporated community comprises approximately

1,571 acres within the proposed national river boundary. This community could be considered either as an exclusion from the boundary or as a private use zone within the present boundary.

Though this is the first national river designation, private use zones have been used as options in national recreation areas. Unlike designated private use zone communities in other areas, Pruitt has very few existing improvements: only 2.3 percent of the land within the incorporated limits is developed, of which only 68 percent is commercial and residential. Also, only 50 percent of the total structures within the city are considered to be structurally sound. Though not all of the incorporated limits lie within the proposed boundary, all the improved properties do (see figure 15). These data were obtained from Pruitt's 1972 Comprehensive Development Plan which also states that Pruitt's future lies in residential use. This plan designates residential use adjacent to the State Highway 7 bridge and the river. At least 25 percent of this residential zone lies on the alluvial flood plain and is still subject to periodic flooding. The plan indicates no expansion of the areas now being used commercially or for industrial purposes. It also states that "the town does not now, nor will in the near future have the ability to provide the basic utilities--such as public water and sewer which people from large urban areas require." National Park Service sewage facilities in the area could not handle the needs of possible residential development in Pruitt.

Developments within the incorporated Pruitt area (all within the proposed Buffalo National River boundary) include:

20 occupied dwellings (18 houses, 2 trailers);
6 vacant dwellings (5 houses, 1 trailer);
5 single tourist cabins, Pearl Holland's camp (total 5 units);
3 single and 2 double tourist cabins, Buffalo River Motel (7 units);
1 post office and store, about 25' x 40', with basement;
1 rock shop, about 30' x 60'
3 buildings, each about 25' x 50', used as craft and gift shops ("Paradise Hill" development);
1 drive-in food service building, about 16' x 24' (near Buffalo River Motel);
1 automotive repair shop, inactive (on ridge one-half mile south of post office);
1 utility building, about 12' x 16;, Pearl Holland's camp;
1 utility building, about 12' x 16', Buffalo River Motel;



1 Motel, Drive-in, Campground, Picnic Area, Cemetery

2 Mobile Home Court, Rock Shop

3 Boat Access, Picnic Area, Post Office-Groc. Store

4 Paradise Hill Shops – Honey House, Smoked Meats, Ozark Crafts

5 Service Station

6 Repair Garage-Salvage Yard

* Residences

— — Incorporated Limits of Pruitt

— — Buffalo National River Boundary

River Flood Plain

N

miles

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Figure 15

Existing Development At Pruitt

Buffalo National River

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1 shower house with restrooms, about 20' x 40', Ozark Campground; and
several barns and smaller farm buildings.

Four miles north of Pruitt is "Dogpatch, U.S.A.," a multimillion-dollar amusement park/convention center/ski and skating area/exhibit area, with more still planned. The close proximity of this attraction where visitation is projected to reach one million per year will generate considerable pressure for public facilities in this area.

Deletion or private use zoning for Pruitt would result in the following impacts:

(1) The community of Pruitt, though presently in poor physical condition, would have the opportunity to grow--as planned, into a residential area.

(2) Pollution of the Buffalo River would continue and increase. As long as the area (projected population of 500) remains residential, no centralized sewage treatment system is expected. Clearly, increased private development would result in more sewage pollution than would occur under National Park Service limited development and tertiary treatment of effluent.

(3) Facilities, such as campgrounds, boat access, food and shopping services, etc., could be provided by private enterprise, without government expenditure.

(4) Exclusion of the community would reduce land acquisition costs for the project by approximately $1,885,200, or conversion to a private use zone with purchase of easements only would reduce the project cost by approximately $1,319,640, both based on comparative sales of similar land and improvements. Newton County would retain an annual tax revenue from the area of approximately $1,400.

(5) The opportunity to protect natural and recreational values for the entire length of the river would be interrupted. Any development which resulted in either visual intrusion upon the river or pollution by sewage would largely negate the value of attempts to preserve the natural conditions for the remainder of the river. Obviously, the water quality of a river is not a local problem. Likewise, the memory of a visual intrusion will be carried downstream with those floating the river.

(6) Large numbers of visitors would congregate in the area, as they probably would if the National Park Service undertook major development. This would result in less dispersion of visitor use and a corresponding increase in trampling of vegetation and compaction of soil in the local area. In general, deletion of Pruitt from within the boundaries of the national river would reduce resource protection efforts for the entire river. As previously discussed under section VIII. A, the no action alternative, local and private land use controls are not particularly effective, thus, no long-term guarantee of adequate resource protection, such as provided by the national river, would be possible.

2. Boundary additions

Although the enabling legislation limits the size of the Buffalo National River to 95,730 acres, a much larger area had been previously considered, in the hope of gaining higher levels of protection for large areas of the Buffalo River watershed.

Because a larger area was not generally considered feasible, the planning process did not consider in detail the impacts of such large-scale acquisition. No land control requirements, land cost estimates, or revenue losses were projected.

If the boundary proposed by the Ozark Society in 1962 (shown on figure 14) had been authorized by Congress, the following impacts could have been anticipated:

(a) Increase in the cost of the project by 300 percent, and a proportionate increased tax loss to the concerned counties. The approximately 370,000-acre proposal would have virtually eliminated the tax base in Newton County if fee purchase lands had been authorized.

(b) Increased socioeconomic trauma associated with relocation of people and businesses. Several small towns including Jasper, Compton, and Marble Falls would have been included, and larger farms of the uplands would have been subject to purchase.

(c) Greater protection for the free-flowing river, since the proposal would have encompassed most of the watershed.

G. Construction of Upstream Reservoirs on Tributaries

In 1964, the Bureau of Sport Fisheries and Wildlife (U.S. Department of the Interior) formulated a development plan which would maximize the potentials for utilization of the fish and wildlife resources in the Buffalo River drainage basin. A key element of this plan is the proposed construction of four dams on tributaries and headwaters of the Buffalo. These dams and associated reservoirs would provide upstream storage with which seasonal low flows could be augmented. The combined storage allocated for flow regulation would total 23,170 acre-feet and provide 100-cubic-feet-per-second (c.f.s) flows for a maximum critical period of 116 days. Total storage would be about 38,000 acre-feet. Construction would be done by the U.S. Army Corps of Engineers in a cooperative agreement with the National Park Service.

Low-flow augmentation would provide increased opportunities for float fishing on the Buffalo. Increased flows during the dry season (July to October) would increase the fishing use of the river from 27,000 man-days to 34,500 man-days, an increase of about 26 percent. Implementation of this plan would result in the following impacts:

1. Approximately 1,400 acres along four tributaries of the Buffalo River would be inundated.

2. Opportunities for fishing and the corresponding demand on the fisheries resource would increase by about 26 percent. This would represent an additional increase in fishing pressure beyond that which will occur as a result of increased visitation. In order to sustain a reasonably high-quality smallmouth bass fishery, intensive management procedures such as stocking with hatchery-reared fish would probably be necessary.

3. Human impact on gravel bars and vegetation adjacent to the river would also increase. Currently, visitor use of the upper reaches of the Buffalo is limited to October through June. This allows the recovery of vegetation and substrate during the summer and early autumn months. Augmentation of low flow would increase the time period during which the upper river could be floated, shortening or eliminating the present annual impact-recovery period.

4. The natural hydrologic regime of the river would be altered. The biota of the Buffalo River ecosystem have adapted through time to conditions of highly variable streamflows. If such flows are stabilized, effects upon the riverine ecosystem may be profound. The smallmouth bass

provides an excellent example of an organism which has adapted to widely fluctuating streamflows. High flows increase area for spawning by forming shallow pools along the flood plain. Low flows tend to increase the concentration of food species in residual pools along the river, and efficient predators such as the smallmouth bass are able to capitalize on this opportunity (Mathis 1964). While the smallmouth bass would remain an important game species under conditions of low-flow augmentation, populations could show decreased productivity. Coupled with the projected increase in fishing pressure, such a phenomenon might result in declining populations.

Reservoirs would trap much of the sediment burden which now finds its way into the Buffalo River. Thus, clear water would be released below the dam instead of the sediment-laden flows that exist previous to construction. The combination of changed flow regime and clear water generally results in a lowering of the channel bed through erosion (Leopold et. al. 1964). Formation of gravel bars may also be retarded if maximum flows are decreased substantially, because transport of relatively heavy sediments generally occurs during periods of high flow.

Alteration of the flow regime of the river would place the existing natural ecosystem under unnatural management constraints. This would reduce the substantial philosophical value of the wild and free-flowing Buffalo River. Although wild rivers are an important part of our heritage, they are rapidly becoming extinct, and there is considerable merit in preserving such a river simply because it is so rare.

In summary, low-flow augmentation would result in a substantial ecological alteration of the riverine ecosystem, with subsequent changes in aquatic plant and animal populations. In addition, one of the last unmanipulated wild rivers in the Ozarks would come under direct human control and management. Such an alteration would not be consistent with the authorization by Congress to establish a national river for the purpose of conserving and interpreting "an area containing unique scenic and scientific features, and preserving as a free-flowing stream an important segment of the Buffalo River in Arkansas for the benefit and enjoyment of present and future generations" (Public Law 92-237, March 1, 1972).

IX. Consultation and Coordination with Others

Comments have been requested from the following:

Federal agencies

Department of the Interior
- Bureau of Indian Affairs
- Bureau of Reclamation
- Geological Survey
- Bureau of Land Management
- Bureau of Outdoor Recreation
- Bureau of Sport Fisheries and Wildlife
- Bureau of Mines

Department of Agriculture
- Forest Service
- Soil Conservation Service
- Farmers' Home Administration

Department of Defense
- Army Corps of Engineers

Department of Housing and Urban Development
Advisory Council on Historic Preservation
Environmental Protection Agency
Federal Power Commission

State agencies

State Historic Preservation Officer (Arkansas)
Arkansas Department of State Planning
Northwest Arkansas Economic Development District
County Judges: Baxter, Marion, Newton, and Searcy Counties
Buffalo River Conservation and Recreation Council
Ozark Society
Mayor of Marshall, Arkansas
Mayor of Jasper, Arkansas
Mayor of Yellville, Arkansas

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APPENDIX A

Land Classification, Administrative Policies for Recreation Areas of the National Park Service, U.S. Department of the Interior, National Park Service, pp. 34-35.

LAND CLASSIFICATION

Master planning requies sound classification for lands in a recreation area. This is necessary to insure that public-facility development is commensurate with the use capabilities of the basic resources and in accord with the legislative intent of Congress for the area. Land Classification in recreation areas thus is a tool of space allocation.

The land classification system used is similar to that proposed by the Outdoor Recreation Review Commission and prescribed for application to Federal lands by the Bureau of Outdoor Recreation, as follows:

> Class I--high density recreation areas; Class II--general outdoor recreation areas; Class III--natural environment areas; Class IV--outstanding natural areas; Class V--primitive areas; and Class VI--historic and cultural areas.

Classes I and II identify the land reserved for visitor accommodations (both existing and proposed), for administrative facilities, public beaches, marinas, formal campgrounds, two-way roads, etc., of high and moderate intensities. Class I and II lands in recreation areas will occupy a relatively higher proportion of the total space as compared to such classifications in, for example, a national park.

Class III identifies the "natural environment areas" which will, to a large degree, make up the bulk of the lands within a recreation area. Ofttimes, facilities and uses are planned in Class III lands which provide for additional public use of the area, such as public recreational hunting, and nature study. Such developments are less intensive than those for Class I and II lands. These developments, moreover, should be in harmony with and facilitate the enjoyment of the natural environment. Other resource uses, not incompatible with the recreation mission of the area may be provided for in the Class III lands, such a timber harvesting and grazing.

Classes IV, V, and VI, while not necessarily found in recreation areas do frequently occur there. While these elements provide the very basis for a national park or monument, they serve more to enhance and supplement the more general features of the Class III aspects of a recreational area. The planner must be keenly aware of Class IV, V, and VI resources within recreation areas as these, preserved and made available to the public, can greatly complement the

recreation area by providing a much broader spectrum of visitor use and enjoyment.

Class IV lands are those encompassing unique natural features, such as Big Spring in Ozark National Scenic Riverways.

Class V lands are primitive lands which should remain pristine and undisturbed as a part of our natural inheritance. Where they exist in sufficient size, they may qualify for study and recommendation to the Congress for designation as wilderness. Facilities in Class V lands should be limited to trails and such limited primitive campsites, shelters, and sanitary facilities as may be required for public use and enjoyment or protection of the Class V values.

Class VI is the lands, including historic structures, etc., of historical or cultural significance, such as the lighthouse at Cape Point in Cape Hatteras National Seashore.

APPENDIX B

Preliminary Reconnaissance Water Quality Survey of the Buffalo National River. Water Resources Research Center, University of Arkansas, 1973

PHYSICAL PARAMETERS

Principal Investigator: Dr. D. G. Parker

Three, two day, sampling trips were taken in order to collect information on water quality. The dates of these trips were May 22-23, June 10-11, and June 24-25.

During each trip eight sampling stations were surveyed. The location of each sampling station is shown on the map, Figure 1. The following is a brief description of the locations of each station:

Station #1: Boxley - located immediately downstream from Highway 21 bridge.

Station #2: Shaddox - located downstream from the confluence with Mill Creek at Shaddox Cemetery.

Station #3: Jasper - located on the Little Buffalo River at Highway 7 bridge.

Station #4: Hastey - located at the low water bridge upstream from Highway 123 bridge.

Station #5: Gilbert - located at the Gilbert landing.

Station #6: Highway 14 - located just downstream from Highway 14 bridge.

Station #7: State Park - located in Buffalo River State Park in camping area above sewage effluent.

Station #8: Rush - located downstream from influent of Clabber Creek.

Water Quality Data:

Tables 1, 2, and 3 list the pertinent water quality information obtained during the study period. The following is a brief description of each parameter:

Flow - Streamflow was determined at stations #2 and #3 to establish the relative quantity of flow in the Little Buffalo. It appears that the flow in the Little Buffalo makes up approximately 29% of the total flow in the Buffalo River below the confluence. This indicates that any water quality problem in the Little Buffalo could have a significant effect on water quality in the Buffalo.

Temperature - The temperature of the water in the river increased slightly from May through June and is generally cooler upstream than downstream.

Dissolved Oxygen - The dissolved oxygen concentration in the river was consistently above 7.2 mg/l which is sufficient to support a healthy aquatic environment.

pH - The pH varied from 7.0 to 7.9; however, no trend is readily apparent.

Color and Turbidity - The color and turbidity of the river water were generally low; however, it was observed during the first sampling trip that both parameters can be significantly affected by rain water runoff.

Nitrate - Variation in nitrate nitrogen are shown in Tables 2 and 3. The concentrations appear to be largest in the downstream stations. This increase could possibly be the result of increased input of agricultural runoff and domestic waste discharges into the river.

Orthophosphate - Variations in orthophosphate are shown in Tables 2 and 3. The concentrations of orthophosphates were determined under field conditions and are possibly inaccurate as a result. However, there appears to be a general increase in

concentration downstream. These variations are probably due to the same factors affecting nitrate.

Alkalinity - Variations in alkalinity are shown in Figure 4. Alkalinity is primarily a measure of the bicarbonate concentration in the water. The alkalinity in the Buffalo River increases in the downstream direction. This increase is probably the result of changing geological conditions as the river drops in elevation.

Hardness - Hardness is a measure of the concentration of divalent metal ions, principally calcium and magnesium. The hardness in the river is similar to the alkalinity and is probably influenced by the same factors that influence alkalinity in this system.

Chlorides - The chloride concentration was low at all stations on the river.

Conductivity - The conductivity of water is primarily influenced by the concentration of dissolved solids in the water. The conductivity of the river increased in the downstream direction and indicates an increase in the dissolved solids concentrations in the lower portion of the river.

Suspended Solids - Suspended solids concentrations in the river are relatively low (< 11 mg/l) except for stations 2, 4, and 5 on May 22-23. This increase was a result of heavy rains which started during May 22.

Total Solids - Total solids increase downstream which is a result of the increase in dissolved solids.

Coliform Organisms - Coliform organisms are indicators of possible fecal contamination in water. The United States Public

Health Service sets a limit of one coliform per 100 ml of water as a safe level for drinking water. Figure 5 shows the variation in total coliforms in the river. Station #3 at Jasper, Arkansas consistently showed high concentrations of organisms and samples collected in Mill Creek above station #2 also showed high coliform counts. The actual sources of this contamination could only be determined by further investigation but there is sufficient evidence to recommend that the Buffalo River water not be used as a source of untreated drinking water.

Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) - The BOD and COD tests were conducted and it was found that the values of these parameters were too low to be significant.

Total Organic Carbon (TOC) - The TOC is a measure of the organic matter in the water and is often related to BOD and COD. It was found that all samples were quite small (< 6.0 mg/l) which indicates that the river water contains only a very small quantity of oxygen demanding material.

WATER QUALITY ANALYSIS

BUFFALO NATIONAL RIVER, ARKANSAS

Date Sampled: May 22-23, 1973

TABLE 1

Parameter	Rush #8	St. Park #7	Hwy 14 #6	Gilbert #5	Hasty #4	Jasper #3	Shaddox #2	Boxley #1
Flow (cfs)	----	----	----	----	----	----	----	----
Temperature (^{0}C)	20	20	20	19	17.5	17	17	17
Dissolved Oxygen (mg/l)	----	----	----	----	----	----	----	----
pH	7.5	7.5	7.5	7.6	7.4	7.6	7.5	7.1
Color (Units)								
Turbidity (JTU)								
Nitrate (mg/l as N)				EQUIPMENT FAILURE				
Orthophosphate (mg/l as PO_4)								
Alkalinity (mg/l as $CaCO_3$)	140	120	120	110	70	80	70	25
Hardness (mg/l as $CaCO_3$)	----	----	----	----	----	----	----	----
Chlorides (mg/l)	----	----	----	----	----	----	----	----
Conductivity (μ Mhos)	----	----	220	200	120	760	140	40
Suspended Solids (mg/l)	2.6	3.0	6.0	20.6	39.6	7.4	23.2	10.6
Total Solids (mg/l)	----	----	144	168	176	104	152	64
Coliforms, Total (Coli/100 ml)	0	0	130	0	5500	5000	300	30
Coliforms, Fecal (Coli/100 ml)	0	0	50	0	1500	670	150	0
Total Organic Carbon (mg/l)	2.1	2.1	2.9	1.9	5.6	----	5.7	3.3

WATER QUALITY ANALYSIS

BUFFALO NATIONAL RIVER, ARKANSAS

Date Sampled: June 10-11, 1973

TABLE 2

Parameter	Rush #8	St. Park #7	Hwy 14 #6	Gilbert #5	Hasty #4	Jasper #3	Shaddox #2	Boxley #1
Flow (cfs)	----	----	----	----	----	----	----	----
Temperature (^{0}C)	22	23	23	22.5	22	19	21	22
Dissolved Oxygen (mg/l)	8.0	8.5	9.0	9.0	75	8.0	10	7.5
pH	7.6	7.6	7.8	7.7	7.5	7.5	7.6	7.3
Color (Units)	5	10	0	0	0	0	20	10
Turbidity (JTU)	5	0	0	0	0	0	5	5
Nitrate (mg/l as N)	0.60	0.20	0.45	0.12	0.09	0.18	0.26	0.08
Orthophosphate (mg/l as PO_4)	0.8	0.5	0.4	0.2	0.2	0.2	0.5	0.1
Alkalinity (mg/l as $CaCO_3$)	112	102	100	95	86	78	91	33
Hardness (mg/l as $CaCO_3$)	----	----	----	----	----	----	----	----
Chlorides (mg/l)	2.8	2.8	2.8	2.8	2.8	4.2	2.8	2.8
Conductivity (μ Mhos)	160	140	140	140	130	120	140	50
Suspended Solids (mg/l)	8	11	9	16	5	5	5	5
Total Solids (mg/l)	67	75	67	63	75	72	80	16
Coliform, Total (Coli/100 ml)	220	100	27	200	330	1700	700	130
Coliform, Fecal (Coli/100 ml)	34	50	10	50	140	190	23	30
Total Organic Carbon (mg/l)	3.2	5.0	3.5	2.7	4.2	3.2	2.6	2.9

WATER QUALITY ANALYSIS

BUFFALO NATIONAL RIVER, ARKANSAS

Date Sampled: June 24-25, 1973

TABLE 3

Parameter	Rush #8	St. Park #7	Hwy 14 #6	Gilbert #5	Hasty #4	Jasper #3	Shaddox #2	Boxley #1
Flow (cfs)	----	----	----	----	----	42	104	----
Temperature (^{0}C)	26	26	27	27	26	23	23	25
Dissolved Oxygen (mg/l)	7.2	7.4	8.9	8.5	8.5	7.4	8.0	8.4
pH	7.5	7.4	7.8	7.9	7.4	7.6	7.7	7.0
Color (Units)	0	0	0	0	0	0	0	0
Turbidity (JTU)	0	0	0	0	0	0	0	0
Nitrate (mg/l as N)	1.2	0.8	0.10	0.06	0.06	0.25	0.10	0.20
Orthophosphate (mg/l as PO_4)	0.2	0.1	0.05	>0.05	0.2	>0.05	0.0	>0.05
Alkalinity (mg/l as $CaCO_3$)	130	127	123	123	106	98	100	42
Hardness (mg/l as $CaCO_3$)	148	136	117	111	105	95	109	43
Chlorides (mg/l)	1.5	1.5	1.5	1.0	1.5	1.5	1.0	0.5
Conductivity (μ Mhos)	250	240	240	220	200	200	220	90
Suspended Solids (mg/l)	1.4	2.7	2.3	2.2	3.5	3.0	3.6	4.8
Total Solids (mg/l)	152	141	120	125	119	111	127	60
Coliforms, Total (Coli/100 ml)	20	22	41	26	29	11000	230	2000
Coliforms, Fecal (Coli/100 ml)	130	7	----	8	4	16000	150	200
Total Organic Carbon (mg/l)	2.1	1.7	2.7	2.1	1.8	4.5	2.9	2.2

Figure 1

Sample Station Locations

Buffalo National River

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ADVISORY COUNCIL
ON
HISTORIC PRESERVATION

WASHINGTON, D.C. 20240

December 21, 1978

Mr. Frank F. Kowski
Director
Southwest Region
National Park Service
Old Santa Fe Trail
P.O. Box 728
Santa Fe, New Mexico 87501

Dear Mr. Kowski:

The Advisory Council is pleased to inform you that the Memorandum of Agreement for the Buffalo National River, in Arkansas, has been approved by the Chairman of the Advisory Council. This completes the Executive Order 11593 process and the National Park Service may proceed with the proposal to conduct emergency stabilization on newly acquired cultural resources. A copy of the Agreement is enclosed.

The Council appreciates your cooperation in the resolution of this matter and commends your contribution to the preservation of our national heritage.

Sincerely yours,

Ann Webster Smith
Director, Office of Compliance

Enclosure

ADVISORY COUNCIL
ON
HISTORIC PRESERVATION

WASHINGTON, D.C. 20240

MEMORANDUM OF AGREEMENT

WHEREAS, the National Park Service, Department of the Interior, proposes to conduct emergency stabilization on newly acquired cultural resources of Buffalo National River, Arkansas; and,

WHEREAS, the National Park Service, Department of the Interior, has determined that this proposal will affect properties eligible for nomination to the National Register of Historic Places and pursuant to Section 2(b) of Executive Order 11593, "Protection and Enhancement of the Cultural Environment," dated May 13, 1971, has requested the comments of the Advisory Council on Historic Preservation; and,

WHEREAS, representatives of the Advisory Council on Historic Preservation, the National Park Service and the Arkansas Historic Preservation Officer have consulted regarding the proposed emergency stabilization program; now,

THEREFORE:

It is mutually agreed that implementation of the proposed undertaking, in accordance with the attached letter of July 19, 1973, from Frank F. Kowski, Regional Director, Southwest Region, National Park Service, with specific conditions under which the work will be performed, to insure preservation of the historic integrity of the properties, will not have an adverse effect.

John D. McDermott (date) 11/13/73
Executive Secretary
Advisory Council on Historic Preservation

F F Kowski 11-21-73 (date)
National Park Service
Department of the Interior

Wm E. Henderson 11-28-73 (date)
Arkansas Historic Preservation Officer

S K Stevens 12/4/73 (date)
Chairman
Advisory Council on Historic Preservation

United States Department of the Interior
NATIONAL PARK SERVICE
SOUTHWEST REGION
P.O. Box 728
Santa Fe, New Mexico 87501

IN REPLY REFER TO:

JUL 19 1973

Mr. Robert R. Garvey
Executive Secretary
Advisory Council on Historic
Preservation
1522 K Street, N.W.
Washington, D. C. 20005

Dear Mr. Garvey:

Pursuant to Section 106 of the National Historic Preservation Act of 1966 and Section 2(b) of Executive Order 11593, the National Park Service requests the Advisory Council to comment on its work program for preservation and stabilization of historic and prehistoric properties in the Southwest Region. This work is programmed mostly for 1974 F.Y., but some projects may carry over into 1975 F.Y. because of budgetary limitations.

The attached project descriptions identify each of the programmed undertakings and discuss the effects upon each cultural resource. Some of these resources are on the National Register and therefore fall under the coverage of Section 106 of the NHPA (items 14 thru 18 on Summary List); others are in process of nomination to the National Register and therefore fall under Section 2(b) of E.O. 11593 (items 1 thru 13).

The general effects of these projects fall into three classes: (1) Holding-action emergency stabilization and repair to retain existing original fabric, thus allowing future preservation treatment as will be determined by Historic Resources Management Plans, (items 1 thru 12 in the Summary List). (2) Safety provisions at historic mine shafts and tunnels (item 13). (3) Continuing stabilization and rehabilitation of basic resources in National Register properties (items 14 thru 18). Item 14--Fort Union-- is described as an emergency project because of severe damage from heavy snow and rain this past winter and spring.

To ensure that these undertakings contribute to the preservation of the integrity of the affected properties, all work will be supervised by a professional restoration specialist, historical architect, or archeologist; and all work will be performed in accordance with the standards and procedures determined by National Park Service historic preservation policies.

We are sending informational copies of this letter and its attachments to the appropriate State Historic Preservation Officers, with the request that they forward any comments upon these projects directly to the Advisory Council, with copy to this office.

Should you require additional information, please contact Ron Ice or Dave Battle of this Office (505-982-3501).

Sincerely yours,

Director, Southwest Region

Enclosures

cc: Louis Wall, Advisory Council, Denver
State Historic Preservation Officers,
Arizona, Arkansas, New Mexico, Texas
all w/encls.

SUMMARY LIST OF PROJECT

Area and Project	Amount
Buffalo National River (Arkansas) Emergency Stabilization, Misc. Hist. Structures	$5,000

PROJECT DESCRIPTION

This project is considered to be absolutely essential for completion during F.Y. '74 or F.Y. '75 to meet our obligations under Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593, Section (2) (b) & (d). Failure to do the work described herein will most likely result in substantial alteration of these structures through deterioration. All of the structures are listed or have been nominated to the National Register of Historic Places and all are on the List of Classified Structures.

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   Through the land acquisition program at this new area, many historic properties are coming into NPS ownership. By way of historical and archeological surveys, in progress and programmed, we are applying National Register criteria to these properties. Pending development of detailed Historic Resources Management Plans and preservation guides, we are obligated to preserve, in acquisition status, all properties that might qualify for the National Register. As a starter in the Buffalo NR preservation program, this project would help hold selected properties in a state that would allow later more extensive preservation treatment.

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